

7. *Further Notes on South African Marine Fishes.*

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(With Plates IX–XIII and 17 Text-figures.)

THIS paper contains notes on the material which has been received at the South African Museum since the publication of my last paper (Ann. S. Afr. Mus., xxxii, 1937). Interim notes and photographs of some of the recent acquisitions have appeared in the Museum Reports for 1937, 1938, 1939 (published respectively 1938–1940).

Several donors have contributed the specimens on which these notes are based. The Museum is greatly indebted to the firm of Messrs. Irvin & Johnson, Cape Town. The skippers and crews of the trawlers of this firm have kept a sharp look-out for rare and unusual fishes; in particular the names of Captains Gibson, McGill, and Pace should be mentioned with gratitude. Thanks are also due to the National Trawling and Fishing Co. Ltd., Cape Town, one of whose trawlers obtained the remarkable new Hand-brush Fish (*Ateleopid*).

The literature published on South African Marine Fishes since 1936 need not be specified here, but one paper was omitted in the list given in my 1937 paper: 1930. Pauca. Ann. Nat. Hist. Mus. Wien, xlv, pp. 33–37 (Walfish Bay records). Also, the reference to Smith's paper on the *Aluteridae* should follow the reference to his paper in Rec. Alb. Mus., iv.

In Mr. J. R. Norman's paper on the John Murray Expedition Fishes (John Murray Exp. Rep., vii, 1939) there are records which extend the distribution of several fishes of the South African faunal list up the east coast of Africa to Zanzibar and the Arabian Sea region.

I wish to express my thanks to Mr. Norman of the British Museum for lending me pamphlets (unobtainable here) from his personal library, and giving me his opinion on several matters concerning morphology and synonymy.

Observations on the oesophageal sacs and teeth of Stromateids, and finally, some notes on hyperostosis of the supra-occipital bone are here given.

FAMILY BRANCHIOSTOMIDAE.

Branchiostoma capense Gilch.

1884. Report S. African Museum for 1883, p. 8 ("*Amphioxus lanceolatus*").

1925. Barnard. Ann. S. Afr. Mus., xxi, p. 12.

The first record of an *Amphioxus* from South Africa is that contained in the above Report. The specimen was dredged in 40 fathoms in Simons Bay (False Bay) by Mr. H. W. Oakley, Assistant Curator, and was identified at the time as the European species.

It was mentioned by Gilchrist, 1902, p. 112, together with the other specimens on which *capense* was founded. Unfortunately Oakley's historic specimen was not returned to the Museum.

FAMILY SCYLLIORHINIDAE.

Scylliorhinus africanus (Gmel.).

1925. Barnard, Ann. S. Afr. Mus., xxi, p. 39.

1939. *Id.*, Rep. S. Afr. Mus. for 1938, p. 12 (albino).

An albino specimen, 450 mm. in length, was caught at Kalk Bay (False Bay) in November 1938 and presented to the Museum by Mr. Fleck.

It was uniform creamy-white all over; the extremities of the fins, especially the caudal, were pinkish, but this may have been due to extravasation of blood after capture. The colour of the iris was cream; the pupil was colourless when the specimen was brought to the Museum, but may have been emerald green in life, like that of *Squalus acanthias*. After preservation in alcohol an extremely faint indication of one of the normal dark lateral stripes appeared.

FAMILY ISURIDAE.

Gen. ISURUS Raf.

Isurus bideni Phillips.*Blue Porpoise Shark.*

1925. Barnard, *l.c.*, p. 33 (*Isurus glauca*, non M. and H.).

1931. Whitley, Rec. Austral. Mus., xviii, p. 140, pl. 20, figs. 1, 2 (*Isuropsis* sp.).

1932. Phillips, W. J., New Zeal. J. Sci. Techn., xiii, p. 227, fig. 2.

1941. Fowler, Bull. U.S. Nat. Mus., no. 100, vol. 13, p. 104.

The South African form of Porbeagle has been described as a distinct species with the above name, after Mr. C. L. Biden. Whether it is distinguished by really constant characters from *Isurus glaucus*, and other species, remains to be tested on a large series of specimens of all sizes.

In Fowler's key, *bideni* is said to have the anal base wholly behind 2nd dorsal fin, in contrast with *glaucus* which has it partly beneath the 2nd dorsal. Two specimens are in the South African Museum: one is a ♂ and corresponds with *glaucus*, the other is a ♀ and corresponds with *bideni*.

FAMILY GONORHYNCHIDAE.

Gonorhynchus gonorhynchus (Linn.).

1766. Linnaeus, Syst. Nat., ed. 12, i, p. 528.

1925. Barnard, Ann. S. Afr. Mus., xxi, p. 125, pl. 6, fig. 4.

1931. Chabanaud, Bull. Soc. geol. Fr., (5), i, pp. 497 sqq. (figs. scale, skeleton, chart of distribution of recent species).

1937. Barnard, Ann. S. Afr. Mus., xxxii, p. 46 (*gronovii*).

At the time of my last note I had not actually seen Chabanaud's paper. Linnaeus' name is accepted: *gronovii* C. and V., 1846, and *brevis* Kner, 1867, being synonyms.

The distribution is from Port Nolloth to Natal, and the islands of Bourbon and St. Paul (southern Indian Ocean).

All the species of the genus are very closely allied and are separated on slight differences in the position of the dorsal fin (see Ogilby, Ann. Queensland Mus., x, pp. 30 sqq.).

FAMILY ARGENTINIDAE.

Gen. NANSENIA Jord. and Everm.

1896. Jordan and Evermann, Bull. U.S. Nat. Mus., xlvii, p. 528.

1922. Gilchrist, Rep. Fish. Mar. Biol. Surv., Rep. 2, Spec. Rep. 3, p. 53 (*Bathymacrops*).

1939. Norman, Rep. John Murray Exp., vii, p. 16.

The genus is provisionally placed in the *Argentinidae* by Norman.

Nansenia groenlandica (Reinhdt.).

1922. Gilchrist, *l.c.*, p. 53, pl. 9, fig. 2 (*B. macrolepis*).

1925. Barnard, Ann. S. Afr. Mus., xxi, p. 129, pl. 7, fig. 3 (*B. macrolepis*).

1939. Norman, *l.c.*, p. 16, fig. 4 (synonyms).

Distribution.—N. Atlantic, near Zanzibar, Maldives.

FAMILY STOMIATIDAE.

1925. Barnard, *Ann. S. Afr. Mus.*, xxi, p. 131.

1930. Regan and Trewavas, *Rep. "Dana" Exp.*, No. 6, p. 53.

The remarkable fish described below was brought up in the trawl about 40 miles W.N.W. of Cape Town from 220 fathoms, September 1937. The skipper of the trawler, Capt. J. T. R. Gibson, who has on several previous occasions brought interesting fish to the Museum, reported that the fish was alive when the trawl came on board, with its head bent downwards almost at right angles to the body. It was photographed in this position ("Cape Times," 16/10/1937). Before placing the fish in alcohol, however, Mr. Drury, of the Museum, found that the flesh of the ventral surface was pulled forwards and hooked over one of the teeth of the lower jaw; he unhooked it and more or less straightened out the head.

I did not see this fish until after preservation. I found then that the head could be eased into the normal position, and that the skin of the chest formed an angular projection below the pectoral fins. On the right side there was a fold of skin into which the opercle would fit when the head was bent down; on the left side there were only a few creases in the flesh. Fig. 1, *a*, shows the fish with head straightened out and the ventral flap extended.

In July 1939 a larger and nearly perfect specimen was captured by Capt. Pace, skipper of one of the same Company's (Irvin & Johnson) trawlers, in approximately the same locality.

This specimen shows that the peculiar convex profile of the upper surface of the head in the first specimen is abnormal; and that the size of the eye in proportion to the head is probably also abnormal. In the second specimen the dentition is asymmetrical.

Gen. OPOSTOMIAS Günth.

1887. Günther, "Challenger" *Rep.*, vol. xxii, p. 208.

1930. Regan and Trewavas, *l.c.*, p. 55.

1941. Imai, *Jap. J. Zool.*, ix, p. 239.

Although there are slight differences in the numbers of dorsal, anal, and pectoral rays, these two specimens are very close to the Australian *micripnus*, the only species included in this genus. Günther stated that maxillary teeth were absent, but Regan and Trewavas say

“maxillary teeth minute, not piercing skin.” The present specimens are in agreement with Günther’s statement.

A more important feature is the presence (in both specimens) of the post-temporal bone (fig. 2, *a, c*), in consequence of which the present specimens cannot be fitted into any of the genera in the key given by Regan and Trewavas (*l.c.*, p. 53). Possibly the post-temporal was overlooked in the type specimen of *Opostomias*; if not, too much taxonomic importance appears to have been attached to the presence or absence of this bone. The Australian and South African species are so much alike that two separate genera are unnecessary.

Opostomias gibsonpacei n.sp.

Figs. 1, 2.

Description of first specimen (Capt. Gibson’s).

Parietal and post-temporal bones present (figs. 1, *e*; 2, *a, c*). Depth



FIG. 1.—*Opostomias gibsonpacei* n.sp. *a*, first specimen, lateral series of photophores diagrammatic, not the exact number. *b*, end of barbel. *c*, end of pectoral ray. *d*, tooth with its denticle. *e*, dorsal view of centre and right side of skull, *p* = parietal bone.

(at ventral fins) 8, length of head (to symphysis of lower jaw, which does not extend beyond tip of snout) 9 in length (excl. caudal fin). Eye 3 in length of head, $1\frac{1}{4}$ in interorbital width. Pupil round, about $\frac{1}{2}$ eye diameter. Snout $1\frac{1}{3}$ in eye, $4\frac{1}{2}$ in head. Thickness of body (at ventral fin) about 3 in depth.

All teeth simple, not apically bifid or barbed; 5 in each jaw, the 2nd upper and 1st lower fang-like, the latter perforating the premaxillae when mouth closed; all fixed except the 2nd in lower jaw, which is depressible; a small denticle, consisting of a soft base with enamel tip and with dermal attachment only, on the inside of each tooth (fig. 1, *d*); a pair of vomerine teeth, the left one depressible, the right fixed; no palatine or lingual teeth.

Symphysis of lower jaw knob-like. Gill-rakers short, spiniform, mostly in pairs, 2 on upper + 8 on lower portion of anterior arch (each pair counted as one raker). Branchiostegal rays 10 (? 11).

Barbel $1\frac{3}{8}$ as long as head (about 58 mm.), black, ending in a slight expansion, which is white, 3 white filaments of fair length and 2 short subapical ones (fig. 1, *b*).

Dorsal and anal arising opposite one another; D 23, 1st ray very short and more or less concealed in skin (last ray double but counted as one). A 26 (the last ray single). C 17, with 3-4 short curved basal rays on upper and lower margins. V 7, midway between tip of snout and base of caudal fin, lateral, but not high up, the outermost ray very slender, filamentous, the other rays broken. P 1 + 5, the lowermost ray about 50 mm. in length, separate, black, with a white margin at about 30-32 mm., which ends freely as a short digitiform process, beyond this the ray continues (about 18 mm.) as an exceedingly fine filament (fig. 1, *c*); the 5 short rays so close together as to appear like only 2 or 3, until dissected out. Lateral surfaces of dorsal, anal, caudal, and ventral fins with minute scabrosities.

Post-ocular luminous organ rather large, longitudinally oval. Lateral photophores present but impossible to count; ventral series: 4 symphysial, 13 branchiostegal, 7 below right pectoral fin as far as the fold of skin (skin on left side injured), 20 to ventral fin, 17 from ventrals to vent, 10-11 long base of anal.

Total length 355 mm. Dark blackish-brown, skin when closely examined, with minute black dots arranged more or less in vertical lines, photophores whitish, those on the branchiostegal membranes amethystine. Innumerable minute white dots which may be photophores (*cf.* Günther, p. 209).

Description of second specimen (Capt. Pace's). Agrees with the first specimen in the presence of parietal and post-temporal bones, and in other features except as follows.

Depth (at ventral fins) $6\frac{1}{5}$, length of head (to symphysis of lower jaw, which projects beyond tip of snout) 8 in length (excl. caudal fin). Eye $5\frac{1}{2}$ in length of head (to tip of snout), $1\frac{1}{3}$ in snout, 2 in

interorbital width. Snout 4 in length of head (to tip of snout). Thickness (at ventral fins) $2\frac{3}{4}$ in depth. Pupil round, approximately $\frac{1}{2}$ eye diameter.

Dentition similar to first specimen except: in lower jaw 2 large fangs on left side, none on right, the socket being covered over with skin (fig. 2, *b*); the peculiar denticles on dermal pedicels are absent,



FIG. 2.—*Opostomias gibsonpacei* n.sp. *a*, head of second specimen, with shoulder girdle indicated. *b*, front view of 1st lower left tooth. *c*, post-temporal bone. *d*, end of barbel.

there is a depressible tooth behind the 4th and the 5th teeth in lower jaw on left side (fig. 2, *a*), on right side 2 depressible teeth (between which the upper fang closes), then 4 fixed teeth, the 2nd of which is the largest, corresponding with the normal 4th tooth on left side, and the hindmost 2 adnate at their bases; teeth in upper jaw symmetrical, the 3rd tooth is the smallest, more or less concealed in skin, and close in front of the 4th, behind the latter a depressible tooth; left tooth on vomer fixed, the right depressible.

Barbel about $1\frac{2}{3}$ as long as head (about 90 mm.), with 3 filaments above, the middle one with a pinkish knob at end, and 2 elongate subapical filaments below (fig. 2, *d*).

D 23, 6th or 7th ray longest, about equal to post-ocular part of head. A 25, 7th or 8th ray longest, slightly longer than longest

dorsal rays, last ray arising at level posterior to origin of last dorsal ray. C 19, with 4 or 5 curved rays on upper and lower basal margins; lower lobe stronger than upper. V 7, length about 46 mm., 1st ray slender but not longer than the others. P 1+5, the lowermost (isolated) ray about 47 mm. in length, the white margin not ending in a free projection (fig. 2, a).

Post- (or sub-) ocular luminous organ oval, whitish, with a red spot in it anteriorly. Lateral photophores not counted; ventral series approximately as in first specimen.

Total length 515 mm. Colour as in first specimen; but all lateral and ventral photophores amethystine. Ventrals grey, all rays pale, membrane between 3rd and 7th rays black in its distal $\frac{2}{3}$ (as in *micripnus*).

Remarks.—It would not be surprising if a re-examination of the types of *micripnus* showed that a few of the dorsal, anal, or pectoral rays were overlooked in the original description (Günther: D 21, A 23, P 1+3). Günther counted 15 branchiostegals; I cannot find more than 11 in either of my specimens. Perhaps the most noticeable difference in the descriptions is the shape of the pupil, which Günther said was vertical; the figure shows it vertically oval, and proportionately much smaller than the round pupil of the present specimens.

There appears also to be a great similarity in the skin of the Australian and South African specimens, with its vertical lines of dark dots, faint pale nebulous banding, and the innumerable scattered minute dots which may be luminous (*cf.* Günther, p. 209).

Although this fish appears to be normally of compressed shape, the first specimen was certainly in an emaciated condition. The gonads were in an early stage of development, too early for sexing. The second specimen was in good condition, and the whole of the body cavity was filled up with the two ovaries, containing an enormous number of eggs, apparently nearly ripe.

In both specimens the stomach and intestine were completely empty. The structure is as described by Regan and Trewavas (*l.c.*, p. 37) for Stomatids in general. The caecal stomach is very long, extending almost to the vent, black with whitish vascular network on its surface; in the smaller specimen there are two subsidiary diverticula on the stomach. The connection between stomach and intestine is very similar to that of *Idiacanthus* (Regan and Trewavas, *l.c.*, fig. 8, E), with two well-developed pyloric caeca.

FAMILY MYCTOPHIDAE.

The expectation (Ann. S. Afr. Mus., xxi, p. 1021, 1927) that *Lampadena* would eventually be found in South African waters has at last been fulfilled.

Lampadena chavesi Collett.

1905. Collett, Zool. Anz., xxviii, p. 728.
 1906. Brauer, Wiss. Erg. D. Tiefsee Exp., xv, p. 210, fig. 129.
 1911. Zugmayer, Res. Sci. Camp. Monaco, fasc. 35, p. 29.
 1914. Pappenheim, D. Südpol. Exp., xv, p. 194.
 1916. Regan, Brit. Antarct. ("Terra Nova") Exp., i, p. 140, pl. 6, fig. 8 (post larva).
 1928. Taning, Vid. Medd. Dansk. Naturf. For., lxxxvi.
 1928. Parr, Bull. Bingham Ocean. Coll., iii, 3, p. 149.
 1936. Fowler, Bull. Amer. Mus. Nat. Hist., lxx, 1, p. 399, fig. 198 (after Brauer).

A fine specimen of this species was caught in December 1943 by one of Irvin & Johnson's trawlers (Skipper Warren) in about 200 fathoms on the Stock-fish grounds N.W. of Table Bay. At the same time a specimen of *Echiostoma tanneri* (Barnard, Ann. S. Afr. Mus., xxxii, p. 48, 1937) was taken from the stomach of a stock-fish.

The present specimen is considerably larger than any of those previously recorded, but appears to agree in all respects with the specific diagnosis given by Parr.

Brauer redescribed Collett's example, which was 70 mm. in length.

Length.—155 mm. (to end of middle caudal rays).

Distribution.—Azores (Collett); off Moroccan coast, 3660 m. (Zugmayer); west of Cape Verde Islands, 3000 m. (Pappenheim).

FAMILY ATELEOPODIDAE.

1925. Barnard, Ann. S. Afr. Mus., xxi, p. 250 (*Ateleopidae*).
 1929. Roule, Bull. Inst. ocean. Monaco, no. 546, p. 13.
 1935. Rivero, Mem. Soc. Cubana Hist. Nat., ix, p. 91 (p. 1 in reprint).*

The family diagnosis as given in 1925 has to be slightly altered. Body more or less elongate. Mouth more or less inferior, protractile, small or large. Teeth present or absent; when present, small, villiform, in bands in upper or in both jaws. Pupil not always very

* My thanks are due to Mr. Norman for lending me his personal copy of Rivero's paper.

small. Perforated scales present on inner wall of the lateral mucus canal which lies below the surface of the skin. Ventral fins jugular or thoracic; each consisting of a more or less elongate anterior ray, followed by 2 or 3 rudimentary or well-developed rays, and also in one genus by a well-developed membrane-bearing fin. Vent and genital opening separate or opening into a common cloaca. No pseudobranchiae.

Rivero found a difference in the pelvic arch between *Ateleopus* and *Parateleopus* on the one hand, and *Ijimaia* on the other hand. The former (*Ateleopinae*) have two foramina and two feeble ossifications; the latter (*Ijimaiinae*) has only a single median foramen and no ossifications.

To these three genera is now added a fourth, remarkable for several features, which might quite reasonably be made the type of a third subfamily. The well-developed ventral fin and the short tail seem to indicate a lesser degree of specialization, whereas the scales in the lateral mucus canal are more highly specialized.

In the South African Museum the name "Handbrush Fish" has been adopted for these fishes, the body being likened to the handle, and the tail with its long anal fin to the brush.

Key to the Genera (adapted from Rivero).

1. Pelvic arch wide, with 2 foramina and 2 ossifications. Head as long as trunk. Ventral ray elongate (no proper fin).
 - a. 8-10 dorsal rays *Ateleopus*
 - b. 3 dorsal rays *Parateleopus*.
2. Pelvic arch narrow, with one median foramen and no ossifications. Head approximately equal to or shorter than trunk.
 - a. Ventral ray short, followed by 3 rudimentary rays (no proper fin). Dorsal rays 9-10 *Ijimaia*.
 - b. Ventral consisting of 3 separate rays and a proper fin. Dorsal rays 12 *Melanogloea*.

Gen. ATELEOPUS Schlegel.

Ateleopus natalensis Regan.

Fig. 3.

1925. Barnard, *l.c.*, p. 251.

1935. Rivero, *l.c.*, p. 7 (in reprint).

1939. Norman, John Murray Exp. Rep., vii, p. 31.

Rivero expresses the opinion that this is probably a synonym of

japonicus Blkr.; Norman is inclined to agree, but points out certain differences.

Where the skin is not abraded, the course of the lateral mucus canal can be traced by a series of shallow depressions. As in the case of *Ijimaia* (*infra*) these depressions do not communicate with the canal. On cutting open the canal, perforated scales at intervals are seen lying on the internal (body side) wall of the canal. These scales are broadly oval, with lines of growth, but without any little projection on the internal surface near the foramen.



FIG. 3.—*Ateleopus natalensis* Regan. Ventral fins: *a*, left fin, slightly enlarged, prior to dissection, and further enlarged showing the components separated after dissection; *b*, right fin of same individual, showing variation. *c*, portion of lateral mucus canal cut open to show perforated scales on inner wall.

Each ventral fin consists of one long ray, segmented distally, and a separate small skinny projection behind it. When dissected the long ray is found to consist of 2 short spines and a long segmented ray, each one paired. In the enlarged figure (3, *a*) these 6 components are drawn separated. The cutaneous membrane enclosing the whole "ray" extends as an unsupported filament well beyond the end of the segmented ray. The rudimentary detached portion also consists of paired elements, but not so closely bound together as in the long "ray." There are 3 pairs of spines (sometimes an extra single one), and the hindmost pair, or one of its halves, may be segmented. This rudimentary fin varies in different individuals, and even on the two sides of the same individual, as shown in fig. 3, *a*, *b*.

The stomach contents of specimens in the South African Museum

consist of Crustacea, both Macrura and Brachyura, but none of the fragments is specifically identifiable.

Distribution.—Off Zanzibar, 640–658 metres (John Murray Exp.).

An interesting juvenile specimen, presented to the South African Museum by Dr. Roux (Vitamin Oils Ltd., Cape Town), was caught during daylight in a surface tow-net about 40 miles N.W. of Table Bay.

Total length 223 mm., depth just in front of dorsal fin 15 mm., at vent 14 mm., and midway between these two points 18 mm. D 10. P 13. A 108 or 109. C 9 (A + C ca. 118). Gill-rakers on first arch 8, lower ones not well developed. Eye $2\frac{1}{2}$ in snout, 7 in length of head, 3 in interorbital width. Top of head flat, in side view the eye almost touching dorsal profile. Dorsal and pectoral fins subequal, about $1\frac{1}{4}$ as long as head. Ventral fin consisting of 3 long simple rays a trifle longer than length of head, and 2 short rays. Pelvic arch with the posterior projections distally expanded, but not as strongly as in adult; the presence of foramina (one or two) not determined with certainty owing to the extreme tenuity of the arch in the centre line. From the vertical of the fore part of dorsal fin a fleshy midventral ridge extends to the vent. A few indications of the formation of scales on the inner wall of the lateral mucus canal were visible, but no actually formed scales could be isolated.

The whole body, pale, semi-transparent (similar to a *Leptocephalus* after preservation), the hind end of the gut near vent greyish showing through the skin; upper part of eyeball blackish, the rest pale, pupil black; front margin and tip of dorsal grey, front margin and tip of pectoral black, anal with a narrow black margin.

This specimen is referable certainly to the genus *Ateleopus*, and possibly to *natalensis*, though *natalensis* has not been found outside the Natal area, and no species of this genus is known from either the north or the south Atlantic.

Gen. IJIMAIA Sauter.

1905. Sauter, Annot. Zool. Japon, v, p. 235.

1929. Roule, *l.c.*, p. 13.

1935. Rivero, *l.c.*, p. 7 (in reprint).

The external differential features of this genus are the head shorter than trunk, and the short ventral ray, followed by 3 rudimentary rays.

Ijimaia loppei Roule.

Fig. 4.

1929. Roule, *l.c.*, p. 14, text-fig.1935. Rivero, *l.c.*, p. 8 (in reprint).

Owing to the flabbiness of the whole fish and the soft and gelatinous

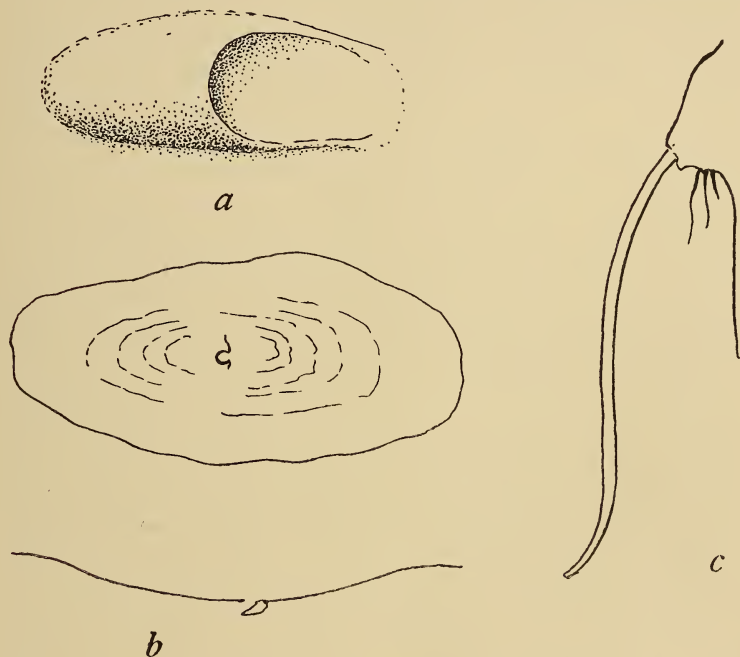


FIG. 4.—*Ijimaia loppei* Roule. *a*, external view of slipper-like pocket in skin over lateral mucus canal. *b*, scale from lateral mucus canal with longitudinal section (in *a*. and *b*. anterior end to left). *c*, ventral fin.

nature of the snout, the usual "exact" measurements cannot be given.

Skin gelatinous and naked; a moderate number of scales embedded in the lateral mucus canal. Vent very prominent. From about the vertical from the vent there is a low mid-dorsal fleshy ridge extending to base of caudal fin (*cf.* Sauter's figure of *I. dofleini*, 1905).

Head shorter than trunk; head plus trunk $\frac{1}{3}$ length from snout to base of caudal rays. A conical knob behind eye, its tip projecting through the skin (? due to abrasion in trawl). Eye 7-8 in post-ocular part of head; 2 in distance from anterior margin of eye to anterior

nostril. Distance from eye to anterior nostril $3\frac{1}{2}$ in post-ocular part of head. Pupil round.

Upper jaw with short band of villiform teeth. Gill-rakers 10 on 1st arch, the lowest one feeble. Branchiostegals 7. Gill membranes free from isthmus.

D 10. P 14. V 1+3. A 79. C 11 (A+C 90). Distance between verticals from base of 1st dorsal ray and end of opercle $2\frac{1}{2}$ in post-ocular part of head. Height of dorsal approximately equal to the longest pectoral rays, and also to distance from anterior nostril to end of opercle; length of base of dorsal $2\frac{1}{2}$ in height of dorsal, 2 in post-ocular part of head. The spine of the ventral fin is about 30 mm. long, stiff, somewhat sinuous, apically acute; the 3 rudimentary rays are 5-7 mm. long, very slender and inconspicuous (fig. 4, c).

Lateral line not so near dorsal profile as in Roule's figure: it lies approximately midway between base of dorsal and upper base of pectoral. In the anterior two-thirds the lateral line has at intervals a series of scales, 38-40 in number, which were not visible before the specimen was skinned and mounted. During the process of skinning, Mr. Drury, the taxidermist, found little hard lumps in the skin in the position of the lateral line. After mounting, these scales showed clearly in the dried skin, especially anteriorly above the pectoral fin. They appear externally as slipper-like depressions (fig. 4, a); but apparently the opening of the "slipper" is a blind pocket, as no tube could be traced leading to the internal mucus canal, although one would expect some such connection. When cleaned the scales are boat-shaped, concave externally, with a tiny foramen at the bottom of the concavity. On the internal surface there is a small cup or spoon-like projection posterior to the foramen (fig. 4, b). No other scales, embedded or superficial, were found either on the tail or the belly (contrast *I. dofleini* Sauter, 1905, though Roule, *l.c.*, p. 15, queries their presence). It is probable that the lateral line scales would be found in Roule's specimens if the mucus canal were dissected out.

Ovaries well developed, but ova not ripe. Genital duct and vent opening into a common cloaca.

Lengths (approximate): snout to base of caudal rays 1025 mm., snout to beginning of anal fin 370 mm., beginning of anal fin to base of caudal rays 655 mm.

Dark brown, very slightly lighter on belly, the dorsal fleshy ridge blackish, dorsal and pectoral fins black, anal and caudal blackish brown. Lining of mouth dark, fold of skin at angle of mouth pale.

Tip of knob behind eye and the spines of ventral fins pale; rays of ventral fins black. Pupil black, iris greyish brown.

Locality.—Off Slangkop Lighthouse (west coast of Capé Peninsula, north of Cape Point), 200 fathoms. Capt. Gibson, June 1939.

Distribution.—Off Agadir, Morocco, 350–400 metres. Two specimens 1845 and 1990 mm. (the latter incomplete).

Remarks.—The specimen seems so like Roule's species (total number of anal plus caudal rays exactly the same) that it may be regarded as conspecific. So few specimens of Ateleopids are known, and their consistency so flabby, that specific characters are hard to find.

Unfortunately the pelvic arch of the specimen was cut up and destroyed in the course of mounting the specimen.

Like the two Moroccan specimens, this specimen is a female. The sex of Sauter's Japanese specimen is not given. Both Rivero's specimens (*I. antillarum*, W. Indies, and *fowleri*, Japan) were females, measuring respectively 1636 mm. and 1534 mm. It may sound a fantastic suggestion, but is it possible that *Ijimaia* is the female of *Ateleopus*? The five specimens of *A. natalensis* in the South African Museum, 350–480 mm., are immature, but so far as they can be sexed appear to be males.

The contents of the stomach and intestines of the present specimen consisted of a large quantity of fragments of the Brittle-star *Ophiura trimeni* Bell (cf. *Ateleopus plicatellus* Gilbert, 1905, Bull. U.S. Fish. Comm. for 1903, pt. 2, p. 654). Together with these fragments were fish-scales belonging apparently to *Photichthys argenteus*. I have compared them with the scales from a *Photichthys* 8 inches in length, and they agree exactly both in size and characteristics. A slim fish such as a *Photichthys* of this size could be just conveniently taken into the mouth by the *Ijimaia*. Sauter (*l.c.*, p. 238) doubts whether the practically toothless mouth could catch or hold quickly moving prey. In the present case there is no means of knowing whether the *Photichthys* was caught alive, or whether the *Ijimaia* was merely scavenging.

These scales have also been compared with those of *Merluccius*, to which they bear some resemblance. But even a fish 16 inches long has scales smaller than those from the *Ijimaia* intestines. So unless *Ijimaia* is a scavenger, the size excludes *Merluccius*.

Melanogloea Brnrd.

1941. Barnard, Ann. Rep. S. Afr. Mus. for 1940, p. 10.

Body not greatly elongate. Head about equal to trunk, tail shorter than head plus trunk. Skin, especially on head and trunk, very gelatinous. Mouth subinferior, very large. No teeth on either jaws, palate, or tongue. Branchiostegals 7. No pseudobranchiae. Dorsal rays 12. Pelvic arch narrow, raised into a median boss dorsally, concealing the foramen which opens posteriorly between the bases of the long curved posterior cornua; ventral fins thoracic, below the pectorals, each consisting of 3 separate rays and a well-developed membrane-bearing fin. Perforate scales in lateral mucus canal tubular in shape. Vent and genital opening separate.

Melanogloea ventralis Brnrd.

Fig. 5.

1941. Barnard, *l.c.*, p. 10, fig. on plate.

Length of head $3\frac{1}{2}$ in length of body, approximately equal to or a little shorter than trunk (depends on how much allowance is made for the gelatinous nature of the snout), and a little greater than depth of body. Eye (approx.) 3 times in snout, which is (approx.) $1\frac{3}{4}$ in post-ocular part of head. Pupil $\frac{1}{2}$ eye-diameter. Mouth very large, when pulled open vertically the gape is about 90 mm., when pulled open laterally about 130 mm. Lips fleshy. Maxilla extending back to below hind margin of eye. Gill-rakers 5 + 17 or 18 on anterior arch, the anterior one or two mere knobs.

D 12, all segmented rays, 3rd longest, the first 3 and the last one simple, the others once bifurcate. A 80. P 13. C 6.

V 1 + 1 + 1 + 7, 1st ray 100 mm. long, flattened basally and slightly grooved above and below, appearing as if composed of 2 rays, but really only a single ray, distally segmented, unbranched, supporting apically a fleshy, club-shaped flap of skin; 2nd ray 30 mm. long, simple, segmented, without fleshy apical enlargement; 3rd ray 75 mm. long, resembling the 1st ray; fin composed of 7 segmented rays, the first simple, the others once bifurcate.

Scales in the embedded lateral mucus canal traceable nearly to end of tail (where not abraded), boat-shaped, tubular. No scales elsewhere on body.

Vent large. Genital opening smaller, behind the latter and quite

separate. No pyloric caeca. Gonads not fully developed, but apparently female.

No recognisable substances or fragments in stomach or intestine.

680 mm. Black, including the exposed parts of the lips, and a marginal border $\frac{1}{2}$ –1 inch wide around the inner surface of the gill-cover; whole cavity of the mouth, and the concealed parts of the



FIG. 5.—*Melanogloea ventralis* Brnd. *a*, whole fish, with one of the posterior cornua of the pelvic arch dotted. *b*, lateral view of right side of pelvic arch. *c*, dorsal (internal) view of arch, posterior cornua not completely drawn, bases of ventral rays shown on one side, arrow indicating median foramen. *d*, external, internal, and side views of one of the tubular scales from the lateral mucus canal.

maxilla white; all fins black; the basal parts of the detached ventral rays greyish, but the fleshy apices of the 1st and 3rd rays jet black; iris dark greyish, pupil transparent.

Locality.—On the Stock-fish grounds north-west of Table Bay and west of Saldanha Bay, 300 fathoms.

Remarks.—This very interesting specimen was caught early in August 1940 by one of the trawlers belonging to the National Trawling and Fishing Co. Ltd., Cape Town. It was in very good condition, except that the head was somewhat abraded and the eyeballs rather

loose in their sockets. The head and body were extraordinarily gelatinous. This was greatly reduced, however, by preservation in alcohol.

Whereas in *Ateleopus* the scales in the lateral mucus canal are broadly oval in shape, and in *Ijimaia* elongate oval (with a small remnant of the tubular portion found in normal external lateral line scales), in *Melanogloea* these scales have become boat-shaped and the lateral margins curled over until they meet and fuse. The whole scale thus becomes a more or less complete tube. The fusion of the margins is not perfect, as several little gaps, variable in number, shape, and size, remain. As increase in the size of the scale is not possible at this fused area, the lines of accretion are seen crowded together between and around these gaps, and sometimes partly obliterating them.

FAMILY MACRORHAMPHOSIDAE.

1925. Barnard, Ann. S. Afr. Mus., xxi, p. 275.

Gen. CENTRISCOPS Gill.

1914. Regan, Ann. Mag. Nat. Hist. (8), xiii, p. 20 (Jan. 1914).

Centriscops humerosus (Rich.).

Red and White banded Bellows-fish.

1911. Waite, Rec. Canterbury Mus., i, p. 170, pl. 26 (var. *obliquus*).

1914. Regan, *l.c.*, p. 21 (*humerosus* and *obliquus*).

1914. McCulloch, Biol. Res. "Endeavour," ii, p. 90 (synonymy) (July 1914).

1938. Barnard, Report S. Afr. Mus. for 1937, p. 12, plate (*obliquus*).

A specimen caught in the trawl (together with *Notopogon macrosolen*) W.N.W. of Table Bay, 270 fathoms, by Capt. Gibson (1937) agrees with Waite's figure.

Total length 230 mm. Tip of snout to anterior margin of eye 55 mm. Depth, from bony knob in front of ventral fins vertically to the dorsal profile, approx. 110 mm. Dorsal profile bristly from occiput almost to where the profile rises to the dorsal spine. Skin very rough to the touch. Eye equal to post-ocular part of head, and to its distance from lower profile of snout, but a little greater than the depth of the cheek. D vii, 16. A 19. C 12 (9 strong main rays).

McCulloch maintains that *obliquus* is the adult of *humerosus*,

the difference in body-shape being accounted for by growth changes. All McCulloch's specimens were banded ("rose-pink" and "yellowish").

The present specimen, after preservation, has the same pink and yellowish banding; but when fresh the yellow bands were almost white. By a slip, in the above-quoted Museum Report the fish was described as "black-banded," the red bands showing black in the photograph.

FAMILY TRACHYPTERIDAE.

Trachypterus arcticus (Brünn.).

Fig. 17 (see p. 406).

1925. Barnard, *l.c.*, p. 353, pl. 14, fig. 3.

On 8th August 1945 Capt. Gibson, skipper of one of Irvin & Johnson's trawlers, captured a very fine ovigerous female of this species. It arrived at the Museum very little damaged, and a cast was made for exhibition.

From base of caudal fin to front margin of eye the length was 2125 mm.; length of snout closed 100 mm.; total 2225 mm. (7 ft. 5 in.).

Snout fully protruded 210 mm. Diameter of eye 87 mm. Depth at pectoral fin 305 mm.; greatest depth (at 400 mm. behind eye) 320 mm.; at 1000 mm. behind eye, 210 mm.; at 1400 mm. behind eye, 85 mm.; at end of tail 10-12 mm.

D 176, rays smooth, no anterior dorsal crest. P 9, 1st ray stronger than the others, longest ray 75-80 mm. C 8, rays about 130 mm. in length. Ventral fins obsolete.

Eggs 3-3.5 mm. in diameter.

Dark spots or blotches (two) scarcely visible.

If the position of the greatest depth of the body is to be regarded as a differential character between *arcticus* and *iris*, the specific identity of the present specimen seems a little doubtful. The greatest depth is in fact posterior to the occipital region, but there is not a great difference between the measurements at the two positions.

Locality.—N.W. of Table Bay, 300 fathoms (Stock-fish grounds).

Regalecus glesne (Ascan.).

1925. Barnard, *Ann. S. Afr. Mus.*, xxi, pp. 354 and 1025.

From perusal of the Museum Reports and old correspondence files the following additional records have come to light:

1876. Simonstown, reported to S. African Museum.

1879. Table Bay, S. African Museum Report for 1879. 8 ft. 6 in., tail mutilated.

1886. February/March. Knysna, reported to S. African Museum.

Since 1927 the following specimens have been reported to the South African Museum:—

1929 May. Kei River mouth.

1930 April. Kentani.

1930 April. Knysna.

1935 March. Gordon's Bay, False Bay.

1936 July. Port St. Johns.

1939 March. Kommetje, west coast of Cape Peninsula.

1939 October. Port St. Johns.

1941 February. Port St. Johns.

Together with those in the 1925 monograph the total is 23 records.

The 1879 specimen is no longer in existence, having probably been discarded when a better specimen came to hand in 1906.

FAMILY MONOCENTRIDAE.

Monocentris japonicus (Hout.).

Fig. 6.

1914. Yoshizawa, *Dobutsu-Gaku-Zashi*, xxviii, p. 411, figs. (luminous organ).

1925. Barnard, *Ann. S. Afr. Mus.*, xxi, p. 360, pl. 14, fig. 6.

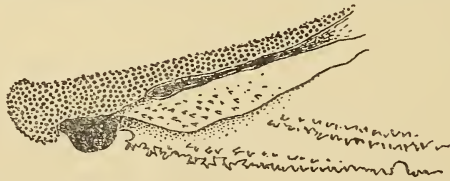


FIG. 6.—*Monocentris japonicus* (Hout.). External view of left ramus of lower jaw, showing luminous pad.

1926. Okada, *Woods Hole Biol. Bull.*, 50, p. 365, figs. 1-7 (photogenic organ).

1928. Yasaki, *J. Exp. Zool. Philad.*, 50, p. 495, pls. (luminescence).

In January 1939 Dr. Nanni, Curator of the East London Aquarium, wrote to me stating he had in his aquarium a Pine-cone Fish with a pair of luminous organs on its chin, and wanting to know whether his specimen could possibly be the Australian *Cleidopus*, in which

luminous organs have been recorded. From diagrams of the essential differences between *Monocentris* and *Cleidopus* Dr. Nanni concluded that his fish was a *Monocentris*. In January the fish had been about four months in the aquarium; in March it died and was forwarded to the South African Museum. I can confirm the identification as *M. japonicus*.

The luminous organs consist of two pads, black in colour (as preserved), below the chin, one on either side of the symphysis, and are glandular in structure. According to Okada the light can be produced both by day and by night. It is spontaneous, though controlled to some extent by the fish; it can be evoked by agitating the water or by chemical stimuli.

FAMILY DIRETMIDAE.

Diretmus argenteus Johnson.

1863. Johnson, Proc. Zool. Soc. Lond., p. 403, pl. 36, fig. 1.

1879. Campbell, Tr. New Zeal. Inst., xi, p. 298, fig. (*Discus aureus*).

1895. Goode and Bean, Ocean. Ichthyol., p. 211, fig. 234.

1939. Norman, John Murray Exp., vii, p. 54.

1944. Barnard and von Bonde, Ann. Mag. Nat. Hist., (11) xi, p. 237, fig. (references).

The last-mentioned paper gives a description and figure of the first-known adult of this species. It was caught in 170–200 fathoms off the west coast of the Cape Peninsula in December 1943. Total length 405 mm.

FAMILY GRAMMICOLEPIDAE.

1937. Myers, Proc. U.S. Nat. Mus., lxxxiv, pp. 145–156.

From an examination of several specimens of *Grammicolepis* and *Xenolepidichthys*, and also the type specimen of *Vesposus*, Myers has shown that *Vesposus* is a synonym of *Grammicolepis*, and that the latter genus and *Xenolepidichthys* are closely allied but separable by certain characters which he sets out in tabular form.

Prionolepis J. L. B. Smith (1931, Rec. Albany Mus., iv, p. 145) (non Egerton 1850) has been withdrawn by Smith himself (1935, *ibid.*, p. 209) as not being *Grammicolepid* at all, but based on a post-larval stage of *Monoceros*.

Thus only two monotypic genera are now included in this peculiar family.

Myers has examined half-grown and "subadult" specimens of

G. brachiusculus Poey, 73–182 mm. (standard length, *i.e.* excl. caudal fin), and the 230 mm. type of *Vesposus egregius* Jordan, which seems to indicate that certain growth-changes occur.

The depth of the body relatively to length decreases with age, the high-arched lateral line becomes flattened into a low curve, and the end of the base of the dorsal fin moves forward relatively to that of the anal fin.

These three features are included in Myers' table as generic features separating *Grammicolepis* from *Xenolepidichthys*. He has, however, seen no specimens of the latter over 90 mm. (standard length), and seems to have assumed that the largest was fully grown; the figure of a 71 mm. specimen is labelled "subadult." No indication was given as to the degree of development of the gonads. In the largest specimen I have seen, 120 mm. total (= 105 mm. standard), the gonads are in a very early stage of development. Three specimens in the British Museum, up to 110 mm. standard length, have been examined by Mr. J. R. Norman at my request. Mr. Norman finds that in all these the gonads are insufficiently well developed to enable the sex to be determined (*in litt.* 11/iv/39). It is true that Gilchrist in his original description (p. 74) mentioned a "mature ♀ of 116 mm.;" but while one does not doubt that statement, it is unfortunate that the specimen is not available for confirmation.

Recently (March 1939), however, a specimen was received by the South African Museum which appeared as if it might be the real adult of *X. dalgleishi*. Its gonads are well enough developed to enable its sex to be determined with fair certainty as a ♂. And it exhibits exactly the three changes in external anatomy mentioned above as occurring during the growth of *Grammicolepis*. Since in other respects the specimen is a *Xenolepidichthys*, these three characters (nos. 8–10 in Myers' table) cannot be used to differentiate the two genera.

I am able to confirm Myer's statements that the pseudobranchiae are present, and that there are 7 branchiostegals.

The description of this remarkable specimen follows. As quite a fair number of specimens of *dalgleishi* were known or recorded from South African waters (Gilchrist, von Bonde, Barnard, Smith: see Myers, 1937, *l.c.*, p. 153),* all of a comparatively small size, and the largest not sexually mature, it seemed eminently reasonable to assume that the large sexually developed individual was merely the adult

* The distribution of *X. dalgleishi* is now known to extend to the Phillippine Is., Japan, and off the coast of British Honduras.

of the former, and not the representative of a distinct species. The description and the remarks were written before I had received Nichols and Firth's paper, and are left as written; with the addition of a comparison between the American and South African specimens of *americanus*.

Xenolepidichthys americanus Nichols and Firth.

Plate IX and text-fig. 7.

1939. Nichols and Firth, Proc. Biol. Soc. Wash., lii, p. 85, fig. 1.

1940. Barnard, Rep. S. Afr. Mus. for 1939, p. 11, plate.

Body ovate, greatest depth below 2nd-3rd dorsal spines, $1\frac{9}{10}$ in length (excl. caudal fin), length of head $4\frac{1}{5}$ in length of body. Eye $2\frac{1}{2}$ in length of head. Maxilla rugulose, reaching to midway between tip of snout and front margin of eye. Preopercle with double serrulate edge. Supra-orbital ridge with its upper surface (forming an elongate triangular area in dorsal view) spinulose. Interorbital ridges spinulose and denticulate [as in *dalgleishi*]. Papillose mucus pores between supra- and inter-orbital ridges, on median side of nostrils, on preorbital, a row in front of the scales on nape, 2 longitudinal rows on chin, each continued along lower margin of preopercle [as in *dalgleishi*]. 12-13 gill rakers on anterior arch (incl. one or two feeble ones) [in *dalgleishi* the number varies from 13 to 15, also incl. feeble ones at both ends of the series].

D vii, 32. 1st spine minute and hidden under skin in a pocket between the predorsal scales, 2nd spine not quite equal to eye, closely serrate on its front edge except the apical sixth, only 4-5 serrations in basal quarter on each postero-lateral edge; 3rd-7th spines thin, filiform, 3rd a trifle longer than 2nd, 4th shorter than 3rd, 5th a little longer than eye, 6th between 3rd and 4th in length but broken, 7th equal to 4th. The 5th and 7th taper to very fine tips, but the 6th is broken and the 3rd and 4th also may be incomplete. 1st articulated ray about $\frac{1}{2}$ eye, longest rays in posterior quarter, subequal to eye. 35 bony scutes along base of dorsal, all except the hinder 3 with a hooked spine, and additional spinules or serrations in front of the spine, more numerous on the anterior than on the posterior scutes. [*dalgleishi* for comparison: 1st spine minute but exposed, 2nd spine serrated for nearly its whole length (where tip not broken off) on all three edges, 3rd spine serrated at base on both postero-lateral edges, preserved in its entirety only in the smallest specimen (65 mm.

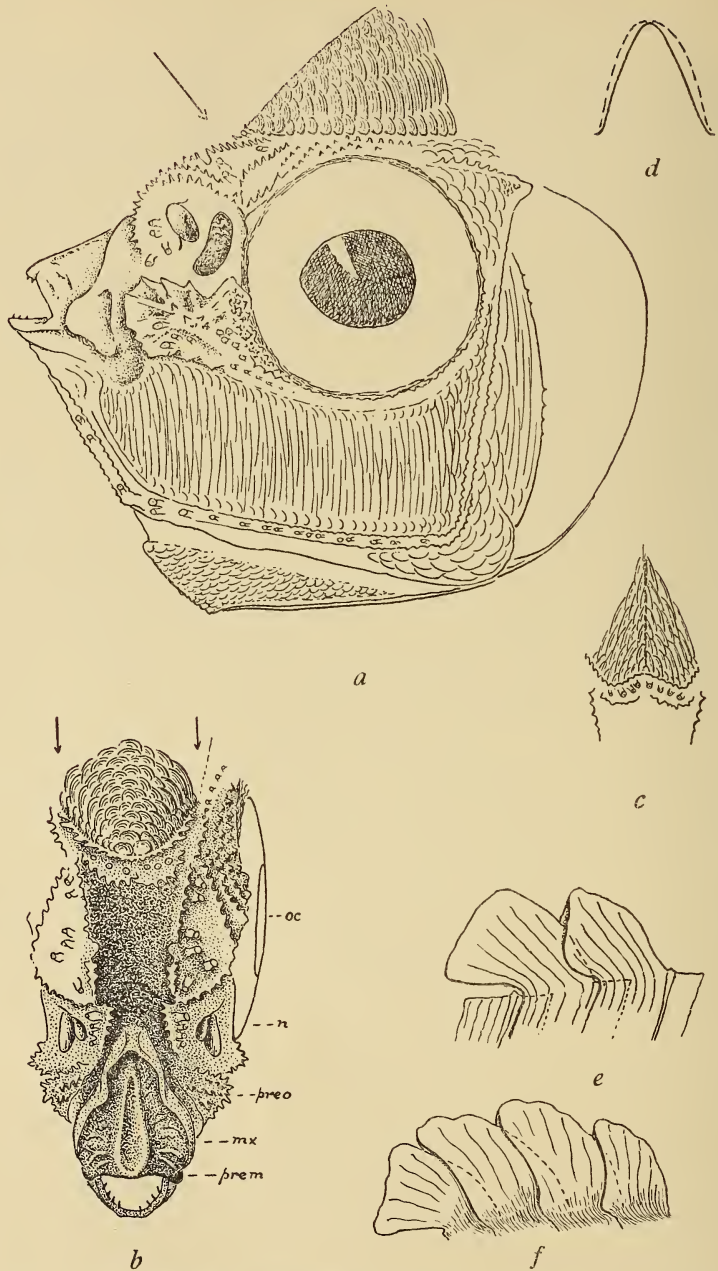


FIG. 7.—*Xenolepidichthys americanus* N. and F. *a*, head, arrow indicates view-point of *b*. *b*, dorsal view of head, width between arrows 14 mm. *c*, dorsal view of nape of *X. dalgleishi* Gilch. for comparison, showing different arrangement and shape of scales. *d*, diagrammatic cross-section of nape at vertical from centre of eye in *X. dalgleishi* (full line) and *americanus* (broken line). *e*, *f*, lateral projections of scales, *f*, from the caudal peduncle (anterior end to right).

total length) where it ends in a fine tip and is twice as long as eye. About 31 bony scutes along base of fin.]

A ii—33. 1st spine very long (Pl. IX), extending back to end of caudal peduncle, triquetral at base (about $\frac{1}{2}$ inch), then quadrangular for about half its length, then again triquetral, serrulate on all 3, resp. 4, edges, but mainly on the front edge (edges) for about half its length, the distal half smooth. 2nd spine $\frac{1}{3}$ eye, triquetral with one or two serrations at base only on each postero-lateral edge, connected by a low membrane (represented by the hyphen in the above formula) in the groove between the basal scutes to the 1st ray which is distant about $\frac{3}{4}$ eye diameter. 1st ray subequal to 2nd spine, longest rays in hinder quarter, subequal to eye, 36 scutes along base of fin, similar to those along dorsal fin. [*dalgleishi*: 1st spine triquetral at base, then more or less quadrangular, then triquetral at tip (where preserved), 2nd spine serrate on both postero-lateral edges, a gap between 2nd spine and first definitely articulated ray, containing 1 (sometimes 2) feeble non-articulated ray.]

A narrow naked groove in front of 1st anal spine extending to vent. [*dalgleishi*: a similar groove but the scales on the two sides of the belly usually meet for a short distance between it and the vent.]

V i. 6. Spine slightly longer than eye, serrated on front edge, 2nd ray $\frac{2}{3}$ length of head, a few spinules on basal portion of 1st-4th rays, on ventral and dorsal surfaces (chiefly dorsal). [*dalgleishi*: these spinules on the rays are inconspicuous.]

P 14, longest rays subequal to eye.

Caudal subtruncate, or rounded if fully expanded. 15 rays, the outermost one, dorsal and ventral, spiniform, subequal to eye and serrated on its outer edge; in addition there is a very short serrated spine dorsally and ventrally in front of the above-mentioned spines, *i.e.* there are 17 in all; longest rays subequal to length of head. [*dalgleishi*: 17 rays, the outermost dorsally and ventrally short but relatively longer than the very short ones mentioned above, neither this nor the next one serrated.]

All the dorsal, anal, and pectoral rays are simple, though articulated; the ventral rays and some of the caudal rays, however, are branched.

Scales.—As in *Grammicolepis* where the high arch of the lateral line of the young becomes a low curve in the adult, so in this specimen the lateral line forms a low, somewhat wavy, curve. There are 97 lateral line scales to the end of the lateral process on caudal peduncle, beyond this some 3-4 obscurely perforated scales, and several small ones extending to base of caudal rays. There appear

to be 5 transverse rows (excl. small scales near ventral margin), but these are not so easy to count except by removing a piece of skin [as was done in the case of a *dalgleishi*]. Gular region fully scaled. 12 scales around caudal peduncle.

The scales, both of the normal subcircular or transversely oval shape, and of the excessively elongate shape, all have a central (in the long axis of the scale) ridge, with numerous but irregular prickles in the case of the elongate scales. The posterior (exposed) field has a few concentric, or in the case of the elongate scales sub-parallel, striae (cf. fig. 8, X. *dalgleishi*).

The lateral projections seen in the photograph (Pl. IX) are outgrowths of the scales. They occur in eleven places on each side, and are almost symmetrically arranged on the two sides. In some places only one scale has this outgrowth, in others 2, 3, or 4 successive scales have them (fig. 7, e, f). These outgrowths are developed on the posterior (exposed) field of the scale, and have an appearance similar to what one would expect by a pinching-up of the scale membrane, and the ordinary scale striae can be more or less clearly traced across them; the anterior field of the scale takes no part in the formation of the outgrowth (cf. *Trachurus* and other Carangids).

When two or more successive scales produce outgrowths, the anterior margin of one is received into the slot-like hind margin of the one in front.

Viewed in profile (*i.e.* from the dorsal or ventral margin of the fish) the posterior outgrowths project slightly more than the anterior, the greatest "height" (that of the hindmost one on caudal peduncle) being 5 mm.

The number of scales participating in each projection is not quite the same in the corresponding outgrowths of the two sides: the upper one on caudal peduncle and the lower anterior one on belly are each formed by one scale on left side, 2 scales on right; the one in centre of the body and the central one just before beginning of caudal peduncle are each formed by 2 scales on left, 3 on right side; the upper anterior one by 2 scales on left, one on right side.

Dimensions: total length (to end of mid caudal rays) 300 mm. (=245 mm. standard length). Thickness greatest at upper hind margin of opercle, 30 mm. Thickness at base of scales on nape in vertical from centre of eye 14 mm.

Colour (after being on ice for a few days) silvery with faint indications of blackish spots or blotches, chiefly towards the belly; upper part of head (interorbital, preorbital) and the snout and lower jaw

blackish, the interorbital and premaxillary groove intensely black; inside of mouth whitish; fins whitish, the anal spine with black rings, some of the rays and intervening membrane of anal with black marks, apices of rays of the ventral fin and a spot at the base of the rays black, caudal rays apically blackish, and some irregular dark spots

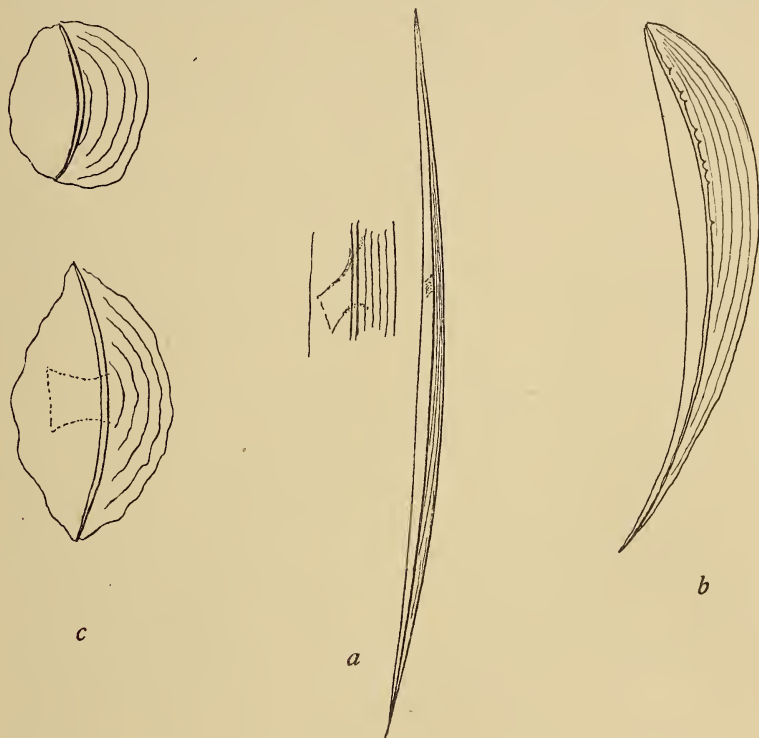


FIG. 8.—*Xenolepidichthys dalgleishi* Gilch. Scales from a specimen 120 mm. in length. *a*, from lateral line behind shoulder, 30 mm. \times 1 mm., with area of lateral line pore further enlarged. *b*, from nape, dorso-ventral length 13 mm. *c*, from caudal peduncle, 1.3 mm. and 2.5 mm.

across the middle of the caudal; the filiform dorsal spines appear to be blackish.

Locality.—Off Table Bay, approximately 250 fathoms. Capt. Pace, March 1939.

Distribution.—Off east coast of N. America (220 miles E.S.E. of Boston Lightships at outer edge of Georges Bank).

Remarks.—In comparing this specimen with *dalgleishi*, there are three features which may be left out of account. These have already

been referred to, and may be regarded as being normal growth changes by analogy with the closely allied genus *Grammicolepis*.

The very long 1st anal spine is paralleled only in the smallest *dalgleishi* hitherto described, viz.: Smith's 43 mm. specimen (*l.c.*, 1935). Normally one finds that a spine (or ray) which is elongate in the juvenile becomes shortened with age. Four specimens of *dalgleishi* in the South African Museum conform with this, but in none of them can one be absolutely certain whether the spine has been broken off in the process of capture or has become shortened by normal wear and tear during the life of the fish.

One noticeable difference between the specimen of *americanus* and *dalgleishi* is the shape of the scales on the nape (fig. 7, *b* and *c*): in the former, scales of an oval or moderately elongate shape are more numerous; whereas in the latter, scales of elongate or considerably elongate shape are more numerous. In the latter also there is a more or less distinct line of demarcation between the scales of the two sides. This difference may be explained by the change in the *transverse* curvature of the nape. The thickness of the nape measured at the base of the scales above the orbit and in the vertical from centre of eye is approximately the same in relation to length of head in the specimen of *americanus* as well as in *dalgleishi*; and the height from base of scales to dorsal profile in the same vertical is relatively the same, being in fact the same as the thickness; so that a cross-section of the nape at the vertical from centre of eye is nearly an equilateral triangle (fig. 7, *d*). But whereas in *dalgleishi* the sides are only slightly convex and meet dorsally in a sharp curve, in *americanus* the sides are more strongly convex and meet in a broad curve.

There remains the difference in the dorsal and anal fin formulae. For *dalgleishi* Gilchrist* gave: D iv. 28, A ii. 28; Barnard (4 specimens): D v. 27-29, A ii. 28; Smith: D v. 27, A ii. 27; Myers (4 specimens): D vi. 28-29, A ii. 27-29. The total number of spines plus rays thus ranges in the dorsal fin: 32-35; in the anal: 29-31.

The specimen of *americanus* on the other hand has D vii. 32, A ii. 33, total D 39, A 35; being an increase of 4 over the highest total for the smaller specimens.

It is clearly better to take the total number on account of the difficulty sometimes of deciding whether a particular fin-support should be called a spine or a ray, the latter being all unbranched.

With only the one specimen one cannot be sure that it has the

* Gilchrist overlooked the minute true 1st spine.

normal fin formulae, but it is reasonable to assume that with the gradual increase in the length of the body another 4 rays might be developed. I have no information on this point, but from my experience with some hundreds of young of the Cape species of fresh-water *Barbus*, the full complement of spines and rays characteristic of each species is developed right at the start; in the case of *Barbus*, however, the length of the fin-base is very short, and no lengthening of the body takes place. In *Xenolepidichthys* the presumed lengthening of the body affects exactly the part subtending the fin-bases.

When we compare *Grammicolepis*, and assuming that Myers' correlation of small and large specimens is correct, we find a very pleasing confirmation that the total number of fin-supports does increase with age. Setting out the lengths of the specimens and the respective dorsal and anal formulae (total numbers), which Myers has most fortunately given, we find:

73 mm.	D 34, A 30.
82 mm.	D 35, A 31.
85 mm.	D 36, A 30.
182 mm.	D 39, A 36.
230 mm.	D 41, A 38.

On the available evidence, therefore, there were good reasons for claiming Capt. Pace's remarkable specimen as the adult of *Xenolepidichthys dalgleishi*. The discovery of the small example described as *X. americanus*, however, puts this assumption out of court.

Comparison of the present specimen (245 mm. standard length) with the type (100 mm. standard) of *americanus*.

The two specimens exemplify the growth-changes which Myers has traced in *Grammicolepis* (*v. supra*), and are thus an additional proof that the three characters (nos. 8-10 in Myers' table) are not generic.

The American and South African specimens are clearly conspecific, and distinct from *dalgleishi*.

The reduction of gill-rakers in the adult (in this case from about 20 in the young to 12-13 in the adult) is not unknown in other fishes.

An increase in the total number (spines + rays) of dorsal and anal "fin-supports," such as suggested above takes place in *Grammicolepis*, is not found (type: D 38, A 36. S. African specimen D 39, A 35).

The change from a forked tail (young) to a subtruncate or rounded one (adult) is not surprising.

The change in the course of the lateral line is not so marked as in *Grammicolepis*.

Nichols and Firth do not state the actual number of groups of lateral outgrowths of the scales ("horizontally flattened spines"), but judging by their figure there seem to be 9, as against 11 in the present specimen.

FAMILY SOLEIDAE.

Zebrias regani (Gilch.)

1925. Barnard, Ann. S. Afr. Mus., xxi, p. 408 (*Aesopia r.*).

1937. *Id.*, *ibid.*, xxxii, p. 54.

Chabanaud (1936, Bull. Soc. zool. Fr., lxi, p. 401) withdraws his proposed subgenus *Pseudaesopia*, and regards Gilchrist's species as a true *Zebrias*, distinguished from *zebra* Bloch, *altopinnis* Alcock, and *fasciatus* Macleay by the contiguity of its eyes.

FAMILY ACANTHOPLESIOPIDAE.

In accordance with Regan's (*l.c.*, *infra*) suggestion, Jordan (Classif. Fishes, 1923) places this family after the *Plesiopidae*. It contains only *Acanthoclinus* Jenyns, 1841,* New Zealand, with 3 (and a partial 4th) lateral lines, and *Acanthoplesiops* Regan, 1912, India, with one lateral line. See also Weber and de Beaufort, Fish. Indo-Austral. Archipel., v, p. 372, 1929.

Gen. ACANTHOPLESIOPS Regan.

1912. Regan, Ann. Mag. Nat. Hist. (8), x, p. 266.

Day described the lateral line as absent, and the ventral fin as having 3 soft rays; Regan corrected these statements. There are only 2 ventral rays, the 1st being bifid.

Acanthoplesiops indicus (Day).

Fig. 9.

1888. Day, Proc. Zool. Soc. London, p. 264 (May) (*Acanthoclinus i.*).

1888. *Id.*, Fish. India. Suppl., p. 798, fig. (Oct.) (*Acanthoclinus i.*).

1889. *Id.*, Fauna India. Fishes, ii, p. 325, fig. 105 (*Acanthoclinus i.*).

1912. Regan, *l.c.*, p. 266.

Depth 4 (or just over), length of head 3, in length of body (excl.

* Not 1842. See Neave, Nomencl. Zool., i, 1939,

caudal). Eye subequal to snout, 4 in head. Maxilla extending to below centre of eye, lower jaw projecting. 2 opercular spines (in the smaller specimen only the upper one developed).

D xviii. (smaller specimen) to xix. (larger) 4. Beginning above hind margin of opercle, 1st ray projecting slightly beyond last spine.

A viii. 4. Dorsal and anal connected with base of caudal.

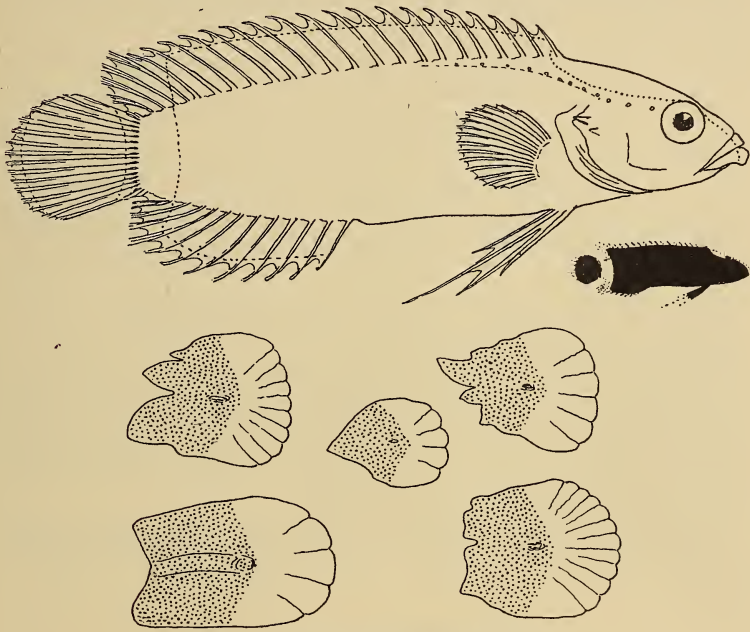


FIG. 9.—*Acanthoplesiops indicus* (Day).

C 16. P 16. V i. 2, 1st ray bifid, its inner branch elongate, extending almost to vent, 2nd ray shorter than outer branch of 1st ray.

Scales of somewhat unusual shape (fig. 9), more or less pyriform, the exposed area ending in a point, or 2-3 points like a cockscomb, or if on the middle of the hinder part of the body (where the lateral line usually is) often more or less symmetrically bilobed. About 36-38 in a lateral series. The whole of the head is naked right up to the origin of dorsal fin, and this bare patch is continued backwards on either side of the dorsal as a narrowing strip until about the 8th-10th spine. A series of mucus pores from behind the eye follows the margin of the naked area until the scaling begins; apparently these pores constitute all that remains of the lateral line tubules, although two

or three at irregular intervals can be traced piercing the scales adjoining the bases of the dorsal spines, but apparently not descending to the middle of the side or on to the almost non-existent caudal peduncle. (Possibly by removing each successive scale separately more exact details would be obtained, but there are only 2 specimens available and they do not belong to the South African Museum.)

Length 26 and 30 mm. Body and fins very dark, almost blackish brown except as follows: a medio-dorsal white stripe from base of dorsal to snout and upper lip, and extending on to lower lip (in dorsal view the stripe is lenticular in shape between dorsal fin and eye); a white cross-band through caudal peduncle and the dorsal and anal soft rays; hind margin of caudal, tips of dorsal and anal spines, and distal half of ventral fin white; pectoral transparent. In the larger specimen the first 2 dorsal spines are included in the medio-dorsal white stripe, in the smaller specimen only the base of the 1st spine. Eye dark.

Locality.—Delagoa Bay. Prof. C. J. van der Horst, 1939.

Distribution.—Madras, India.

Remarks.—Day described the species from one specimen an inch long. Regan seems to have examined a specimen, as he corrected certain of Day's statements, but he was concerned only with its systematic position, and gave no locality. I cannot find any later reference to the occurrence of this little fish.

At first glance the fish looks like the letter A or N in the Morse code according as seen from the right or the left side, thus: · — or — · (fig. 9).

FAMILY APOGONIDAE.

Epigonus telescopus (Risso).

1927. Barnard, *l.c.*, p. 523.

1935. Fowler, Proc. Ac. Nat. Sci. Philad., lxxxvii, p. 383.

I have examined a specimen, 460 mm. in length, caught in 1940 by a local trawler and submitted to the Zoology Department, University of Cape Town. It corresponds with my description of the specimen in the South African Museum, but the dorsal spines are longer; apparently I did not make enough allowance for the length of the broken tips. In the present specimen the 4th spine is broken at the tip, but was probably the longest since; it is now, as is likewise the complete 3rd spine, $1\frac{1}{3}$ times the eye, the 5th is $1\frac{1}{4}$ times the eye, and the 6th about $\frac{7}{8}$ the eye.

Although externally in good condition, the initial preservation was not penetrating enough to preserve the internal organs in a good enough condition to enable the pyloric caeca to be accurately counted; but the number does not seem to be as high as 22. Two specimens submitted by the Fisheries Survey, caught in December 1943, were in too poor a condition for an accurate count, but there were certainly not as many as 22 caeca. Fowler records it from off the Natal coast.

FAMILY CARANGIDAE.

Trachurus capensis Cast.

1861. Castelnau, Mem. Poiss. Afr. austr., p. 43.

1927. Barnard, *l.c.*, p. 531, pl. 23, fig. 1 (*trachurus*).

1934. Fowler, Proc. Ac. Nat. Sci. Philad., lxxxvi, p. 443 (*trachurus*).

1935. Nichols, Copeia, no. 2, 16th July.

Nichols, on the basis of 10 specimens from "south-west Africa (probably Walfisch Bay)," finds that the South African specimens are deeper in the body than the Mediterranean *trachurus*, and more slender than the northern European *semispinosus*; and they have a greater number of dorsal and anal rays than either of these species.

The accessory lateral line extends back under the second dorsal fin.

Nichols is inclined to regard the forms occurring in various geographical regions as subspecies.

Elagatis bipinnulatus (O. and G.).

1927. Barnard, *l.c.*, p. 562.

Specimens of this species have been caught in False Bay in February, March, and December 1928 (C. L. Biden), and in December 1941 (Fleck).

FAMILY BRAMIDAE.

Gen. TARACTES Lowe.

1843. Lowe, Proc. Zool. Soc. Lond., p. 82.

1929. Bigelow and Schroeder, Bull. Mus. Comp. Zool. Harv., lxix, pp. 41 sqq.

The joint authors have discussed the genus and the several species. They regard *longipinnis* and *asper* as separate species on account of the rounded caudal fin of the latter. They do not agree with Smitt's

union of *princeps* with *longipinnis*, apparently considering Smitt's *princeps* is the same as Johnson's *princeps*.

Taractes longipinnis (Lowe).

Plate X.

1927. Barnard, Ann. S. Afr. Mus., xxi, p. 594.

1929. Bigelow and Schroeder, *l.c.*, p. 45, pl. (*princeps*).

1939. Barnard, Rep. S. Afr. Mus. for 1938, p. 12, pl. 2.

[Not: Fowler, Bull. Amer. Mus. Nat. Hist., lxx, p. 653, fig. 293,* 1936.]

Description of the large mounted example (Camps Bay, 1938) (Pl. X, lower figure). The specimen was mounted while I was out of town, and none of the internal parts (gill arches, gonads, pyloric caeca) were preserved.

Depth 2 in length (reckoned to end of scaling on caudal peduncle), length of head $4\frac{1}{2}$. Thickness $5\frac{1}{4}$ inches between eye and edge of opercle, $5\frac{3}{4}$ inches in middle of flank at vertical from origin of dorsal fin (*i.e.* greater than in *princeps* Johnson). Eye vertically oval, its minor (horizontal) diameter 4 in length of head and 1 in snout (if measured flat as in the photo, but $4\frac{1}{2}$ and $1\frac{1}{2}$ if measured on the curve); major diameter about $1\frac{1}{2}$ in distance from its upper margin to the high rounded profile of head. Preorbital $\frac{1}{3}$ minor diameter of eye. Maxilla extending to below first $\frac{1}{4}$ of eye.

Gill opening extending upwards to level of middle of eye, distance of its upper limit to upper base of pectoral being twice the length of pectoral base. The photograph gives a false impression that the gill opening ends lower than it actually does; the upper margin of the opercle is formed by projecting scales which fit very closely against the scales on the body; 3 depressed scales on the body (seen in photograph as a slightly darker spot) opposite the hind rounded angle of the opercle mark the *apparent* upper extent of the gill opening (*cf.* Bigelow and Schroeder's figure).

A distinct transverse groove dorsally and ventrally on caudal peduncle at base of caudal lobes.

D 34, 4th longest (possibly actually the 5th, but if there is a very short ray in front it is not counted here), about equal to length of head. A 25, 3rd longest (maybe actually the 4th), about $1\frac{1}{3}$ in length of head. Length of head $1\frac{1}{3}$ in length of pectoral. Ventral about

* The legend to the figure says "after Lowe," instead of after Smitt. Lowe published no figure of his species, his pl. 7, quoted by Fowler, illustrates an entirely different fish. Smitt's figure seems to refer to *raschii* Esmark.

equal to major diameter of eye. In the low part of both dorsal and anal fins the rays project beyond the membrane.

Scales.—Lat. series 20 with pores, 26 without pores, to level of grooves on caudal peduncle, plus 9–10 posteriorly, total 55–56. The first 20 scales show more or less clearly a single or a bifurcate mucus channel. About 4 rows of scales along the flanks have a slight median horizontal ridge; and some of the scales on the belly (laterally) have a small median point, apparently the remains of a spine. Around the caudal peduncle there are 22 scales, and though the lateral scales are slightly ridged, none bear spines. Head, except the interorbital and snout, scaly; dorsal and anal fins scaly.

Teeth in bands on jaws anteriorly, posteriorly a single row; this single row, continued anteriorly as the inner row of the band, contains slightly larger teeth than do the bands. A single row of incurved teeth on palatines; no teeth distinguishable on vomer.

Length.—From end of middle caudal rays to tip of snout 765 mm., to tip of lower jaw when closed 775 mm.

Colour.—Brownish or bronzy above, many of the scales with dark vertical marks, silvery laterally and ventrally; dorsal and anal fins silvery, with blackish margin anteriorly and at tips of the prolonged portions, continued submarginally along the short rays, the tips of which are white and project beyond the black stripe; pectoral blackish above, greyish below; ventrals black with white tip and white internal edge; caudal with black upper and lower margin, the concave portion with white margin, and black submarginal band; iris brownish, pupil bluish black.

Description of half-grown specimen (Simonstown, 1876), taken from the dried and mounted half-skin (Pl. X, upper figure).

Depth $1\frac{2}{3}$ in length, length of head $3\frac{1}{2}$. Eye approximately (a circular glass eye has been inserted in the skin) $3\frac{1}{2}$ in length of head, slightly greater than snout. Preorbital approximately $\frac{1}{3}$ eye diameter. Maxilla extending to below middle of eye. Gill opening extending upwards to level of middle of eye, distance between its upper limit and upper base of pectoral twice length of pectoral base.

Teeth as described for the larger specimen. The vomer has been cut through, but the row of teeth on the palatine is distinct.

Dorsal and ventral transverse groove on caudal peduncle.

D 33 or 34, 3rd (maybe the 4th) $1\frac{1}{3}$ in length of body, almost 3 times length of head. A 26 or 27, 3rd nearly as long as longest dorsal ray. Rays of both dorsal and anal projecting beyond membrane in low part. Pectoral and ventral broken.

Scales.—Lat. series 45 (not counting the very small ones on base of middle caudal rays), the posterior 10 with antrorse spines, the 7 or 8 in front of these with spines directed backwards; 6 or 7 rows on the flanks with slight ridges, those on the hinder part of the flank with backwardly directed spines; 20 around the caudal peduncle, the row above and below the mid lateral row of scales bearing antrorse spines. Head, except interorbital and snout, scaly; dorsal and anal scaly.

Length.—From end of middle caudal rays to tip of snout 300 mm.; the 350 mm. given in my 1927 description included the caudal lobes.

Remarks.—Photographs of the two specimens here described were submitted to Mr. J. R. Norman of the British Museum for comparison with British Museum specimens and figures in works not accessible here (Lütken, etc.).

Mr. Norman very kindly informed me (*in litt.* 30/xii/38) that a specimen in the British Museum, 540 mm. in length, thus intermediate in size between our two specimens, has the fins proportionately intermediate in length. Thus the lobe of the anal fin is about equal to the length of the fin. In our smaller specimen the lobe of the anal is $1\frac{1}{2}$ times the length of the fin, in Bigelow and Schroeder's specimen it is $1\frac{1}{2}$ in the length of the fin, and in our large specimen twice in the length of the fin. These four specimens therefore constitute a series in which the relative lengths of the lobe of the anal fin and of the body are correlated.

The length of the lobe of the dorsal fin seems also to be correlated with the length of the body (not given for B.M. specimen), except that Johnson's figure does not fit.

The following table includes data so far as they are available.

	Length mm.	D.	A.	Height of Lobe of D in Length of Base and in Length of Fish.	Height of Lobe of A in Length of Base and in Length of Fish.	Scales.	$\frac{L}{D}$.
<i>asper</i> 1876 specimen (S. Afr. Mus.)	300	33 33-34	23 26-27	$1\frac{1}{2}$ times base $1\frac{2}{3}$ in length body	$1\frac{1}{2}$ times base	43 45	$1\frac{2}{3}$
<i>longipinnis</i> Lowe	460	35	28			41-45	$2\frac{3}{11}$ approx.
<i>princeps</i> (Br. Mus., Norman)	540				height of lobe = length of base	45	
<i>princeps</i> (Big. and Schr.)	670	35	28	$1\frac{2}{3}$ in base $3\frac{1}{2}$ in body	$1\frac{1}{2}$ in base	43	1.9
1938 specimen (S. Afr. Mus.)	765	34	26	$2\frac{1}{2}$ in base $4\frac{1}{3}$ in body	2 in base	45	2
<i>princeps</i> Johnson	825	5 + 27-33	29	1: $2\frac{1}{7}$ length of fish		45	$2\frac{1}{2}$

The conclusion that the two South African fishes are young and adult of the same species seems not unreasonable; but, as Mr. Norman says, a lot more material is required to put the taxonomy of these fishes on a sound basis.

Bigelow and Schroeder's specimen was caught 50 miles S.W. of Cape Sable, Nova Scotia, on a hook at a depth not exceeding 50 fathoms.

FAMILY HISTIOPTERIDAE.

Histiopterus spinifer Gilch.

Plate XI.

1927. Barnard, Ann. S. Afr. Mus., xxi, p. 620, pl. 31, fig. 2 (adult).

1939. Norman, Rep. John Murray Exp., vii, p. 65.

A photograph of a young specimen, 72 mm. in total length, is reproduced to show that the coloration is not always uniform. In juveniles there are black spots on a silvery-white ground-colour, the fins also being spotted.

The specimen was caught off Cape Infanta by Capt. McGill, April 1938. Another specimen of approximately the same length was caught on the Agulhas Bank in May 1941.

Distribution.—Gulf of Aden (Norman).

FAMILY AMPHIPRIONIDAE.

Amphiprion polymnus (Linn.).

1893. Saville-Kent, Gt. Barrier Reef Austral., p. 308, chromo pl. 16, fig. 7 (*A. clarkii* Benn.).

1927. Barnard, *l.c.*, p. 729.

1928. Fowler, Fishes Oceania. Mem. Bishop Mus., x, p. 303.

1928. *Id.*, Bull. U.S. Nat. Mus., no. 100, vol. vii, p. 6.

Specimens collected at Delagoa Bay exactly resemble the figure in Saville-Kent's work: white (in life most of the white is yellow) with a black stripe through eye, another through spinous dorsal, another through hinder part of soft dorsal, caudal and pectoral each with a round black spot, margins white, ventral fins blackish in front.

FAMILY SCOMBRIDAE.

Gen. *NEOTHUNNUS* Kish.

1923. Kishinouye, Scombroid Fishes, pp. 45, 445.

1926. Jordan and Evermann, Occ. Papers Calif. Ac. Sci., xii, pp. 8, 18.

1933. Fowler, Proc. Ac. Nat. Sci. Philad., lxxxv, p. 163.

Fowler includes in his genus *Semathunnus* the genotype *S. guildi* from Tahiti, and the "imperfectly known" *itosibi* and *allisoni*, and possibly the unidentifiable *albacores*.

The reference to Fowler is given above without implying that I agree that certain species should be taken out of *Neothunnus* and included under *Semathunnus*. The pectoral ridge, and the completeness or otherwise of the corselet, are features which may prove to be available as generic distinctions.

Neothunnus albacora (Lowe).

Plate XI.

1788. Bonnaterre, Encycl. Meth., p. 140. Based on a rough drawing by Sloane. (See Jordan and Evermann, *infra*.) (*Scomber albacores*.)

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., viii, p. 148. Based on Sloane's figure. (*Scomber sloanei*.)

1839. Lowe, Proc. Zool. Soc. Lond., p. 77. (*Thynnus albacora*.)

1910. Cunningham, *ibid.*, p. 110, fig. 4, juv. (*Thynnus a.*)

1926. Jordan and Evermann, *l.c.*, p. 23. (*N. albacores*.)

1929. Frade, Bull. Soc. Port. Sci. Nat., x, p. 235, pl. 5, fig. 2.

1935. J. L. B. Smith, Rec. Albany Mus., iv, p. 207, fig. 4. (*N. itosibi*.)

1936. Fowler, Bull. Amer. Mus. Nat. Hist., lxx, pt. 2, p. 623, fig. 282. (*Germo a.*)

1939. Barnard, Ann. Rep. S. Afr. Mus. for 1938, p. 12, pl. (photo of mounted specimen). (*N. itosibi*.)

Depth of body 4, length of head 4, in length of body. Greatest thickness (at bases of pectoral fins and in middle of body) $5\frac{1}{2}$ in length of body. Eye 7 in head, $3\frac{1}{2}$ in interorbital width, $2\frac{1}{2}$ in snout. Maxilla extending to below anterior margin of eye. Width across lateral caudal keel slightly greater than length of snout. Behind the lateral keel are two smaller keels slightly oblique at the start, and continuing to the two small lobes in the centre of the caudal fin. A horizontal lateral ridge from base of pectoral, against which upper margin of fin fits when laid back. Gill-rakers $9 + 21 = 30$.

D xiii. 13 (or 14). 1st spine 3, 2nd $2\frac{3}{4}$ in length of head. 9 detached finlets and 1 semi-detached at hind base of soft dorsal. A ii. 9 (or 10), 9 detached and 1 semi-detached finlets. Pectoral not quite as long as head.

Corselet deeply excavate behind. The lateral line runs nearly horizontal from upper end of opercle to below 1st dorsal spine, then rising rather abruptly and following a gently curved course, sinking gradually to below soft dorsal, where there is another, smaller, rather abrupt bend down to the middle of the flank, thence horizontal to the lateral keel on caudal peduncle.

Length (to end of middle caudal rays) 5 ft. 6 in.

Colour.—Bluish black above, shading to bluish on sides, silvery white below, with more or less conspicuous silvery spots from the level of the soft anal backwards, lower jaw white, grooves around end of maxilla black, inside of mouth black, spinous dorsal blackish brown, soft dorsal and anal dark on front edge, yellowish behind, finlets bright yellow with black margins, caudal greyish with pale yellowish tinge, pectoral bluish on upper margin, white below.

Locality.—Off Cape Infanta, Agulhas Bank, April 1938. The Museum is indebted to Capt. McGill, skipper of the trawler "Bluff," for taking care of this specimen when it came up in the trawl, and delivering it at the Museum in excellent condition.

Remarks.—The specimen had been gutted when brought to the Museum, so the liver could not be examined. Dissection during the course of skinning seemed to show the cutaneous blood-vessels passing through the myotome of the 5th vertebra (as in *Thunnus*), whereas in *Neothunnus* they are said to pass through that of the 7th vertebra.

There are several differences between this specimen and the description of the stuffed specimen given by Smith. The unsatisfactoriness of the specific diagnosis of this species is shown by the following table. Jordan and Evermann examined more than one specimen, but did not record the number of dorsal and anal spines and soft rays. There is much to be said for Smith's surmise that probably only one, circumtropical, species should be recognised. The manufacture of species based on photographs, and *a fortiori* on old drawings, surely cannot advance our knowledge of these fishes (*cf.* Fowler's remarks).

In the table I have included *S. guildi*, because there are several resemblances to our specimen. On the other hand Fowler notes the absence of the ridge (or groove) from the pectoral base in his specimen, whereas it is present in Jordan and Evermann's photograph and in our specimen. Fowler's figure also shows the pectoral arising very much higher up, opposite the upper end of opercle; and his specimen was completely scaled.

A second specimen, caught off Simonstown in January 1946, has

also been examined. It measured 5 ft. in length and was stated to weigh 125 lb.

Body completely scaled. Liver not striated, trilobed, right lobe the longest. Spleen large (*cf.* Godsil and Byers, Div. Fish and Game, Californ. Fish Bull. No. 60, 1944). Gill-rakers 20 + 8 on 1st arch. Other characters as in table.

Fowler (1936) regards the Pacific *macropterus* (Temm. and Schleg.) and *allisoni* (Mowbray) from Florida as synonymous. In 1933 he regarded *itosibi* as insufficiently known.

I think there can be little doubt that the Cape specimens should be referred to *albacora*, which has been recorded in the eastern Atlantic down to St. Helena.

	Length (inches).	l/d.	l/h.	h/e.	s/e.	D.	A.	Finlets D/A.
<i>N. itosibi</i> type {text . . .	...	4½	4	...	...	...	...	9/8
{photo . . .	...	...	4	7½	2½			
,, another spec. . .	75	3	4	9				
,, Smith {text . . .	66	5	4	12	4½	xv. 14	ii. 12	9/9
{fig. . .	...	4½	4½	8½	3			
S.A.M. specimen, 1946 . .	60	4½	4½	7¾	3	xiv. 12	ii. 10	9 (10)
,, 1938 . . .	66	4	4	7	2½	xiii. 13	ii. 9	9 (10)
								9 (10)
<i>S. guildi</i> Fowler . . .	73	4	4	7	2½	xiii. 13	v. 8	10/9

Scomberomorus commersoni (Lacep.).

1927. Barnard, *l.c.*, p. 802.

A very fine specimen, one of a large shoal, was caught off Kalk Bay, in False Bay, in March 1944; length 49 inches, weight 24 lb.

FAMILY BLENNIIDAE.

1927. Barnard, *l.c.*, p. 831.

1943. Norman, Ann. Mag. Nat. Hist. (xi), 10, p. 793 (synopsis of genera).

The present time is not opportune for a revision of the South African species, but the list of recorded species may be set out with their equivalents in Norman's arrangement; and also a key simplified and adapted from those given by Norman.

Barnard 1927.	Norman's nomenclature.
<i>Blennius bifilum</i> Gnthr.	<i>Rhabdoblennius</i> (<i>Antennablennius</i>) <i>b.</i>
„ <i>cornutus</i> (Linn.)	<i>Blennius c.</i>
„ <i>fascigula</i> Brnrd.	<i>Blennius f.</i>
„ <i>punctifer</i> Regan	Not specified by Norman.
„ <i>cristatus</i> Linn.	<i>Blennius c.</i>
„ <i>scullyi</i> G. and T.	[Syn. of <i>cornutus</i> , fide Smith 1935.]
„ <i>ocellatus</i> G. and T.	Not specified.
„ <i>hypoetes</i> Klunz.	<i>Rhabdoblennius</i> (<i>Antennablennius</i>) <i>h.</i>
„ <i>capito</i> C. and V.	<i>Chalaroderma c.</i>
<i>Petroscirtes woodi</i> (G. and T.)	<i>Omobranchus w.</i> [syn. of <i>striatus</i> fide Fowler 1931].
„ <i>rhinorhynchus</i> Blkr.	<i>Aspidontus r.</i>
„ <i>elongatus</i> Peters	<i>Omobranchus e.</i>
„ <i>variabilis</i> Cant.	<i>Dasson v.</i>
„ <i>mitratus</i> Rüpp.	<i>Petroscirtes m.</i>
<i>Aspidontus taeniatus</i> Q. and G.	<i>Aspidontus t.</i>
<i>Salarias sexfasciatus</i> von B.	[Syn. of <i>Blennius bifilum</i> , fide Smith 1935.]
„ <i>rivulatus</i> Rüpp.	Not specified.
„ <i>dussumieri</i> C. and V.	<i>Istiblennius d.</i>
„ <i>meleagris</i> C. and V.	<i>Istiblennius m.</i>
„ <i>unicolor</i> Rüpp.	<i>Istiblennius u.</i>
„ <i>kosiensis</i> Regan	<i>Cirripectus k.</i>
„ <i>periophthalmus</i> C. and V.	<i>Istiblennius p.</i>
„ <i>oortii</i> Blkr.	<i>Istiblennius o.</i>
<i>Xiphasia setifer</i> Swains.	<i>Xiphasia s.</i>

Later additions to fauna list:

<i>Blennius steindachneri</i> Day	<i>Blennius s.</i>
„ <i>trifascigula</i> Fowler	Not specified.
<i>Petroscirtes striatus</i> J. and L.	<i>Omobranchus s.</i>
„ <i>tapeinosoma</i> Blkr.	<i>Aspidontus t.</i>
<i>Salarias edentulus</i> (Schn.)	<i>Istiblennius e.</i>
„ <i>frenatus</i> Val.	Not specified.

I. Caudal free.

A. No bony crest on premaxilla. Teeth large or moderate, more or less attached to bone and usually immovable.

1. Interorbital less than eye. Canines, if any, well developed in both jaws, the lower ones not enormous compared with the upper.

a. Gill membranes forming a fold across throat. Gill openings wide

Blennius.

b. Gill membranes united to isthmus, no fold across throat. Gill openings restricted.

i. Gill openings extending downwards in front of pectoral base. Skin loose and flabby

Chalaroderma.

ii. Gill openings entirely above pectoral base, usually smaller than eye

Omobranchus.

2. Interorbital equal to or greater than eye (except *Petroscirtes*). Canines small in upper jaw, relatively enormous in lower jaw.

a. Gill opening entirely above pectoral base.

i. Dorsal rays 13-15

Petroscirtes.

ii. Dorsal rays 28-31

Dasson.

b. Gill opening extending down in front of pectoral base. Dorsal rays 26-38

Aspidontus.

B. A bony crest on premaxilla forming a groove for reception of upper lip. Teeth (except *Rhabdoblennius*) small, implanted in lips, movable.

1. Crest on premaxilla covering roots of teeth, which are moderate, more or less attached to bone, and somewhat movable

Rhabdoblennius.

2. Crest not covering roots of teeth, which are very small, implanted in lips, and freely movable.

a. Anal spines in ♂ modified to form fleshy dendritic masses. Two or more tentacles on each side of nape

Cirripectus.

b. Anal spines in ♂ not or only slightly modified, not dendritic. A single tentacle on each side of nape

Istiblennius.

II. Caudal united with vertical fins. Body eel-like

Xiphasia.

FAMILY CLINIDAE.

Gen. CLINUS Cuv.

1927. Barnard, *l.c.*, p. 850.

1931. Smith, J. L. B., Rec. Albany Mus., iv, p. 154.

1937 (March). Barnard, Ann. S. Afr. Mus., xxxii, p. 63.

1937 (May). Smith, J. L. B., Ann. Natal Mus., viii, p. 194 (distribution).

In any future revision of the South African species, I would suggest the possibility of *agilis* Smith, 1931, being the young of *taurus*, which according to Smith, 1937, extends as far as Plettenberg Bay.*

In order to indicate the possible variations or aberrations which may be found, descriptions are given of two specimens both from Port St. Johns, one found several years ago, the other in 1944. The first might be a *superciliosus* with reduced number of dorsal fin spines and anal rays. The second may also be a *superciliosus* without supraorbital tentacles. The shape of the head and snout is quite different from that of *pavo*, the only species with a dorsal crest and no supraorbital tentacles.

♀. 160 mm. Depth of body 4, length of head $3\frac{1}{2}$, in length of body. Eye equal to snout, $4\frac{1}{2}$ in length of head. Interorbital $1\frac{1}{3}$ in eye. Maxilla extending to below posterior third of eye. Nasal (anterior) tentacle fringed; supraorbital tentacle flattened and fringed. No occipital groove. Front row of teeth stronger than inner rows. D iii. + xxviii. 5, beginning in vertical from between preopercle and hind margin of eye, 2nd spine in crest $\frac{1}{2}$ length of head, membrane of 3rd spine reaching to base of 4th; the 3 spines of the crest each with a tuft of cirri, all the other spines each with a single apical cirrus. A ii. 22 (=24). V i. 2. Lateral line a single row of pores.

♂. 130 mm. Body not strongly compressed. Depth of body subequal to length of head, $4\frac{1}{2}$ in length of body. Eye slightly greater than snout, 4 in length of head. Interorbital 2 in eye. Maxilla extending to below centre of eye. Nasal (anterior) tentacle fringed. No supraorbital tentacle. No occipital groove. Front row of teeth stronger than inner rows. D iii. + xxvii. 5, beginning in vertical of hind margin of preopercle (or slightly in front), 1st and 2nd spines of crest about $\frac{1}{2}$ length of head, membrane of 3rd spine reaching to

* Smith (1945, Ann. Mag. Nat. Hist. (xi), 12, pp. 535-546) not only retains *agilis* as a distinct species, but places *taurus* and *agilis* in different genera.

base of 4th, a gap between the 14th and 15th spines (the 11th and 12th excluding the crest) filled with membrane without the spine, cirri apparently absent. A ii. 22 (=24). V i. 3, 3rd ray very small. Lateral line a single row of tubules. Red-brown, mottled, 8 dark patches on dorsal fin, 6 on anal fin, caudal and pectoral with narrow bars on the membrane "staggered" and not always forming continuous unbroken lines across the fin. Indications of two dark bars from eye, one horizontal to hind margin of opercle, the other passing obliquely behind end of maxilla.

FAMILY STROMATEIDAE.

1902. Regan, Ann. Mag. Nat. Hist. (7), x, pp. 115 and 194 (classification).

1922. Gilchrist, *ibid.* (9), ix, p. 249 (oesophageal teeth).

1923. Gilchrist and von Bonde, Fish. Mar. Surv., Rep. 3. Special Rep. 4 (S. African species).

1927. Barnard, *l.c.*, p. 889.

Having occasion to examine a fresh specimen of the rare *Cubiceps capensis*, it seemed worth while to repeat, in general, Gilchrist's observations on the oesophageal teeth. This has been done for all the genera occurring in South Africa.

No comment is made on the homologies of the oesophageal sacs suggested by Gilchrist; I have merely examined the structure of the toothed processes within the sacs.

Gilchrist's figures of these processes in *Stromateus* and "Psenes natalensis" are confirmed except for minor differences. The provisional name "Psenes natalensis" is a *nomen nudum* for a species which was called in 1923 *Psenes africanus*, and which I am inclined to regard as synonymous with *P. indicus*.

On p. 253 Gilchrist describes the oesophageal sacs, upper pharyngeals, and papillae of "Psenes (*Atimostoma* Smith, *Cubiceps* Günther) capensis." This is remarkable because in the following year (1923, p. 7) Gilchrist and von Bonde state that Smith's stuffed type in the British Museum is the only known specimen, and quote Regan's taxonomic description.

But Gilchrist was in possession of the specimen (caught in 1919) which he afterwards made the type of *Centrolophodes irvini* (1923) (which in 1927 I regarded as synonymous with *Centrolophus niger*), and his description of the pharyngeals and oesophageal sacs agrees with these structures in *Centrolophus niger*. It is true that the

description would in fact also fit *Cubiceps capensis*, but one must conclude that Gilchrist described these structures from a fish which he

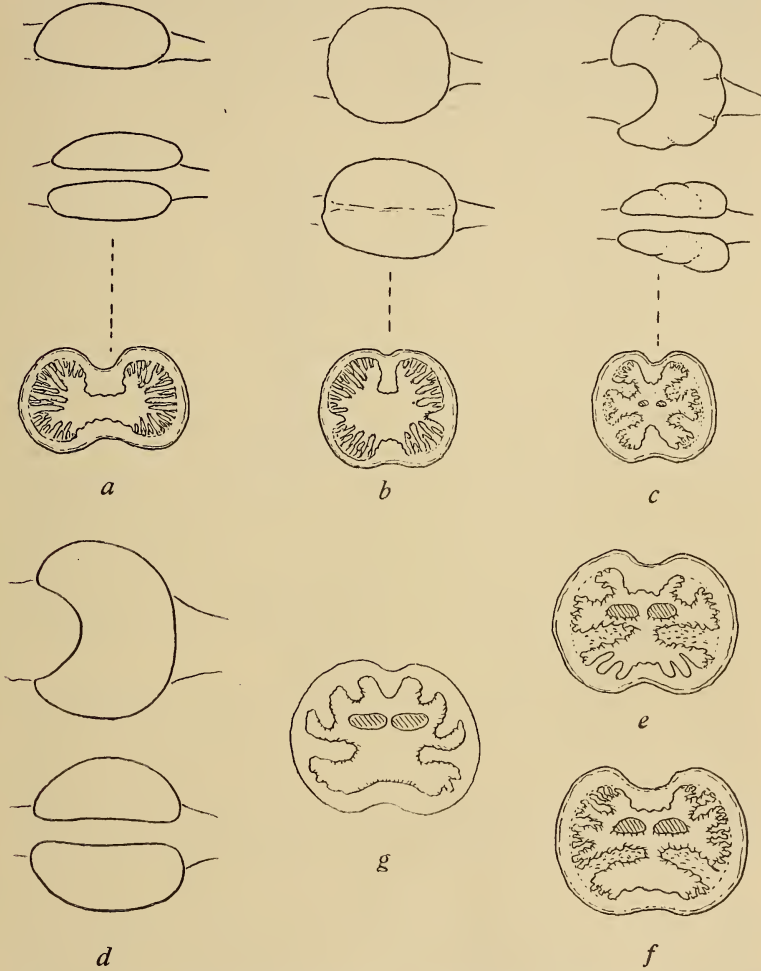


FIG. 10.—*Stromateidae*, oesophageal sacs. Lateral and dorsal views, and cross-section of: a, *Psenes indicus*. b, *Stromateus fatola*. c, *Nomeus grovonii*. d, lateral and dorsal views in *Centrolophus niger* and *Cubiceps capensis*. e, f, g, cross-sections in *Centrolophus niger*, *Cubiceps capensis*, and *Schedophilus ovalis* respectively.

In the lateral and dorsal views the branchial arches are situated on the left, the oesophagus on right. In the cross-sections the obliquely shaded oval structures are the 4th upper pharyngeal teeth; they are not shown in the figure of *Stromateus* because they only just enter the anterior part of the sac.

had actually before him; and that the name in an *anatomical* paper was a temporary *pis aller* (cf. "*P. natalensis*," *supra*) or a *lapsus*

calami. In accordance with this conclusion, corrected references for the two species are given below.

Fig. 10 shows the differences in form and situation of the oesophageal sacs in the genera examined. In *Psenes indicus* the two sacs are longitudinally ovoid and lie parallel with the course of the oesophagus (10, *a*); in *Stromateus fiatola* the two sacs together form a nearly globular mass, in side view nearly circular and extending both above and below the oesophagus (10, *b*). In *Nomeus*, *Centrolophus niger*, *Cubiceps capensis*, and *Schedophilus ovalis* each sac is kidney-shaped and lies athwart the oesophagus, as Gilchrist says, "following the general contour of the branchial arches" (10, *c, d*). Their appearance certainly suggests that they are a specialised development of the closed-up gill-slit behind the 5th branchial arch.

Gilchrist came to the conclusion that the spiniferous lining of the sacs was derived from two different sources; in the one case being homologous with the spiniferous lining of the upper pharyngeals ("*Psenes capensis*" = *Centrolophus*, and *Nomeus*), in the other case homologous with the gill-rakers (*Psenes* "*natalensis*," and *Stromateus*). It seems rather doubtful to me whether detailed studies of the structures in question would confirm this view. In the case of *Psenes* "*natalensis*" Gilchrist examined the gill-rakers and found that they "showed the same structure" (p. 252). If this statement implies that the gill-rakers have a circular or oval base, my observations do not confirm Gilchrist's.

In *Psenes indicus* and *Stromateus* the sacs are lined with numerous spiniferous papillae, of all sizes, projecting inwards more or less radially (fig. 10, *a, b*). Each of these papillae (Gilchrist: "long horny processes resembling gill-rakers") has its own base for attachment to the muscular wall of the sac. This base is round and scale-like in *Psenes*, stellate in *Stromateus* (cf. Gilchrist, figs. 1 and 2).

I find that in *Psenes* the base is not always circular, but is very often irregularly oval, and the papilla seems to arise normally at one side of it, not centrally (fig. 11, *a*). In *Stromateus* the basal root-like processes are not always curved at their extremities as Gilchrist shows them.

In *Nomeus*, and especially in *Centrolophus niger* and *Cubiceps capensis*, the inner wall of the sac is lobed and plicate; in the two latter species there is a particularly strong digitiform process anteriorly in the lower half of each sac *vis-à-vis* the 4th upper pharyngeals (fig. 10, *c, e, f*). The whole lining is beset with spiniferous papillae (fig. 11, *b, c, d*). None of these, however, attains the size, relatively

to the lumen of the sac, that the papillae do in *Psenes* and *Stromateus*.

In *Schedophilus ovalis* there is a rather broad spiniferous area projecting into the anterior part of the lumen between the sacs (? an extension of the lower pharyngeals) but not extending to the hinder part of the lumen which is strongly plicate (fig. 10, *g*).



FIG. 11.—*Stromateidae*, papillae from lining of oesophageal sacs. *a*, *Psenes indicus*. *b*, *Cubiceps capensis*. *c*, *Nomeus gronovii*, a small and a large papilla. *d*, *Centrolophus niger*, on right a small papilla, or one at an early stage of growth.

In *Cubiceps capensis* and *Nomeus* the papillae have stellate bases (fig. 11, *b*, *c*). In *Centrolophus niger* they are of heavier build, somewhat like a humped-up starfish, and when closely packed they form quite a firm "horny" layer, which has a Polyzoan-like appearance when the spines are rubbed off (fig. 11, *d*).

It seems therefore that there is no essential difference between the *Psenes-Stromateus* type and the *Nomeus-Cubiceps* type. In the former the individual papillae grow to an enormous size relatively to the lumen of the sac, which they nearly fill; in the latter, outgrowths of

the wall, covered with relatively small papillae, occupy most of the lumen.

Also, it would seem that the words used in Regan's key (1902, *l.c.*, pp. 120, 121), "oesophagus with (*per contra*: without) longitudinal plications" are not very happily chosen to form the antithesis required in the key. *Psenes* and *Centrolophus* both fall within his first category.

Centrolophus niger (Gmel.).

Figs. 10, *d, e*; 11, *d*.

1902. Regan, *l.c.*, p. 195.

1922. Gilchrist, *l.c.*, p. 253 (oesophageal teeth, quoted as "Psenes (*Atimostoma* Smth., *Cubiceps* Gnthr.) *capensis*") (non *Cubiceps capensis* (A. Smith)).

1923. Gilchrist and von Bonde, *l.c.*, p. 3, pl. 17, fig. 1 (*Centrolophodes irvini*).

1927. Barnard, *l.c.*, p. 895, pl. 33, fig. 1.

1935. Fraser-Brunner, Proc. Roy. Irish Ac., xlii, B, p. 323.

Since my 1927 paper I have seen two more specimens. One is half-grown, 450 mm. to end of middle caudal rays, and was caught by a trawler off Table Bay, approx. 200 fathoms, in 1937. The other is a large specimen, 1165 mm., caught in the same locality in November 1941.

Beyond recording these specimens, the only point that need be mentioned is that the upper pharyngeals on the 2nd arch form an oval patch (in contrast with the linear patch in *Cubiceps capensis*, *v. infra*). Fraser-Brunner notes the difference in coloration of the sexes.

Gen. CUBICEPS Lowe.

1927. Barnard, *l.c.*, p. 891.

1930. Chabanaud, Bull. Mus. Nat. Hist. Paris, (2), ii, p. 519.

1938. Fowler, Monogr. Ac. Nat. Sci. Philad., 2 (key to species).

The diagnosis has to be altered in regard to the palatine teeth, which may be present or absent. Regan's 1902 diagnosis gave "palatine teeth absent." McCulloch (1923) described a 79 mm. *caeruleus* Regan, and a 371 mm. *baxteri* n. sp., both with palatine teeth. Chabanaud says his *dollfusi* n. sp. (up to 145 mm.) differs from all other species of this genus in the absence of teeth "au palais" (vomer and palatines).

Fowler (1934, Proc. Ac. Nat. Sci. Philad., lxxxvi, p. 442, fig. 23)

describes *longimanus* n. sp. from a juvenile 55 mm. long, from Natal, with D viii. i. 15 and A i. 14, pectoral slightly shorter than head.

I have not seen Fowler's 1938 paper.

Cubiceps capensis (A. Smith).

Figs. 10, *d, f*; 11, *b*; 12.

1845. A. Smith, *Illustr. Zool. S. Afr. Fishes*, pl. 24.

1902. Regan, *l.c.*, p. 123.

1923. Gilchrist and von Bonde, *l.c.*, p. 7.

1927. Barnard, *l.c.*, p. 891.

[Not *Psenes capensis* Gilchrist, 1922, *l.c.*, p. 253 = *Centrolophus niger*.]

Description of a male specimen, 460 mm. in length (to end of middle caudal rays).

Depth equal to length of head, $3\frac{3}{4}$ in length of body (excl. caudal fin); thickness at bases of pectorals a little greater than half length of head. Caudal peduncle just over $1\frac{1}{2}$ times as long as deep (scarcely $1\frac{2}{3}$ as in stuffed type). Eye equal to snout, $3\frac{3}{4}$ in length of head, $3\frac{4}{5}$ in interorbital width (measured point to point, not round the strongly convex curve). Maxilla extending to vertical from a point midway between eye and posterior nostril; without supplemental bone, and entirely concealed under preorbital when mouth closed. Preorbital depth (at end of maxilla, narrower posteriorly) $\frac{1}{2}$ eye diameter. Snout rounded. Lips thin. Nostrils far forward, inter-narial distance $1\frac{1}{2}$ times in distance from posterior nostril to anterior margin of eye.

Branchiostegals 6. Gill membranes free from isthmus. Gill-rakers 10+18 on 1st arch, longest rakers subequal to filaments, $\frac{1}{2}$ diameter of eye. Pseudobranchiae well developed.

A single row of setiform teeth in both upper and lower jaws, regular and close-set but not adjacent to one another. A single longitudinal row on vomer, and on each palatine (fig. 12).

Tongue slightly concave in its free portion (to receive the vomerine teeth) with a small number of scattered setiform teeth; behind the tongue there is a roof-like ridge between the gill-arches, with a single median row of setiform teeth, fitting into the V-shaped groove of roof of mouth (fig. 12). Upper pharyngeals: no teeth on 1st arch, a linear patch on 2nd, a rhomboidal patch on 3rd, 4th projecting into lumen of oesophageal sac. Oesophageal sacs, see *supra*. Pyloric caeca numerous but uncountable on account of surrounding fatty tissues.

D xi. 23. 1st spine arising in vertical from middle of pectoral base; 3rd spine longest, subequal to or a trifle longer than spine at beginning of soft dorsal; 9th and 10th spines concealed in groove between spinous and soft dorsals; an unusually wide gap between the 6th and 7th spines suggests that one spine is here undeveloped, though the membrane between the 6th and 7th spines is unbroken. A iii. 20,

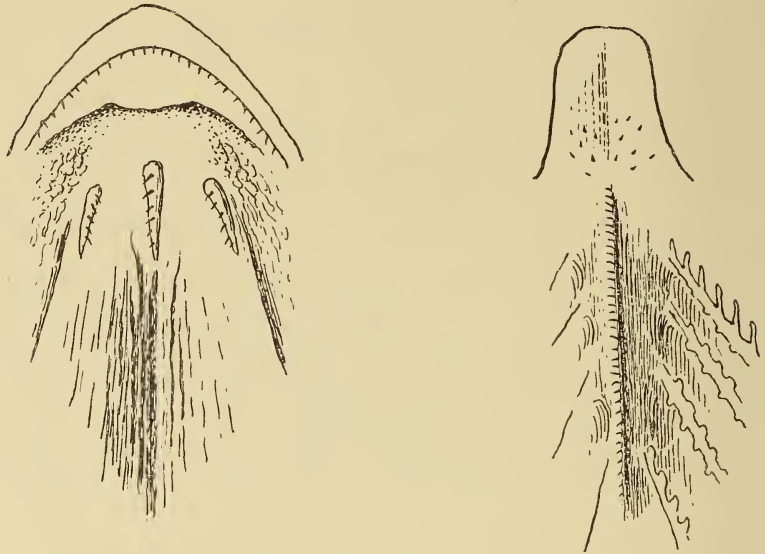


FIG. 12.—*Cubiceps capensis* (A. Smith). Left: view of roof of mouth. Right: tongue and ridge between gill arches.

3rd spine $3\frac{1}{4}$ in length of head, subequal to 3rd dorsal spine. P 24, $1\frac{1}{3}$ times length of head; direction of insertion of base nearly horizontal. Ventral $2\frac{1}{2}$ in length of head, spine arising below base of last pectoral ray. Caudal from base of middle rays to end of lobes $\frac{3}{4}$ length of head. The fin has been split in the middle apparently as a result of injury in early life, and the two lobes can be easily folded, the one completely over the other.

Most of the scales are lost; a few remain near the pectorals and along the bases of soft dorsal and anal. One to 3, sometimes 4 or even 5, pores in each scale pocket. Scaling on head extending almost to tip of snout (to vertical from anterior nostril), and to the margin of orbit except the anterior portion, continued on preorbital to vertical from nostrils; on cheek and subopercle, extending to symphysis of lower jaw; on gular membrane and on throat, extending

to isthmus. Soft dorsal and anal scaly at base, and also pectoral for a short distance.

Scales large, cycloid, exposed surface with rather inconspicuous crinkly subparallel longitudinal striae. Lateral line: 66 to base of caudal, 52 or 53 to vertical from base of last dorsal ray. Approximately 46 from beginning of scaling on snout to origin of dorsal fin. L. tr. 6 between lat. line and spinous dorsal, and between l.l. and spine at beginning of soft dorsal, the uppermost scale being the narrow one next to the scaly fin-base; 5 between l.l. and 1st-3rd rays, and 4 between l.l. and remainder of soft dorsal; 22 between l.l. and middle line of belly; 12 from l.l. to level of base of hindmost pectoral rays, and 6 from this point to base of spine of ventral fin; 18 between l.l. and anterior part of anal fin; 12 between l.l. and last anal ray; 28 around caudal peduncle; 6 (7) rows of small scales on cheek next to orbit, followed by 2 rows of large scales; 10 between orbit and upper limit of gill opening, the hinder 3 being large scales.

Colour.—Purplish brown, the snout paler, tongue and lining of mouth intense blue-black, dorsals, anal, caudal, and ventrals blackish grey, pectorals lighter.

Locality.—Off Table Bay, approximately 200 fathoms, June 1939.

Remarks.—This specimen was caught by Capt. Pace, skipper of one of Irvin & Johnson's trawlers. It agrees very well with Regan's description of Andrew Smith's stuffed type, which is approximately $2\frac{1}{3}$ times larger.

The specimen is interesting as being the second * of this species to be obtained in a century (Andrew Smith left the Cape in 1837). No young specimens seem to have been caught either by the Fisheries Survey or the trawlers, or, if so, they have not been recognised as of sufficient importance to be saved; on commercial trawlers small fish are dumped overboard, except those of strikingly bizarre appearance.

The Cape species may be retained under Andrew Smith's name, though very possibly it will eventually have to be included in *gracilis* Lowe 1843, when more material is available.

Andrew Smith stated that the head was without scales except behind the posterior edge of orbit; but in the figure there are distinct indications of scales on the interorbital as far at least as

* Mr Norman, however, informed me (*in litt.* 10/vii/39) that he received four rather small specimens in October 1925 which he identified as this species. They were taken from the stomach of a Sei Whale caught 70 miles W.N.W. of Saldanha Bay and were presented to the British Museum by Hans Ellefsen Ltd.

above centre of eye, and the artist has carried the purplish colour forward almost to above the nostrils, which is approximately where the scaling begins in the present specimen. In fact Smith's figure is a very good one, except that the scaling on the caudal peduncle has been continued too far backwards, making the middle caudal rays absurdly short.

Gen. SCHEDOPHILUS Cocco.

1829. Cocco, Giorn. Gab. Messina, i, p. 30, and Innom. Messina Ann., iii, p. 57.

1833. Cocco, Giorn. Sci. Lett. Sicil., xiii, p. 20 (*Mopus*).

1834. Lowe, Proc. Zool. Soc. London, p. 143 (*Leirus*, nom. preocc. Meg. in Dahl., 1823, Coleopt.).

1843/4. Valenciennes in Webb and Berthelot, Ichthyol. Iles Canaries, p. 43 (1843, *fide* Sherborne; 1844, *fide* Prussian Acad. Nomenclator). (*Crius*.)

1846. Agassiz, Nomencl. Zool., p. 213 (*Lirus* emend. for *Leirus* Meg. and *Leirus* Lowe).

1902. Regan, *l.c.*, p. 195 (*Lirus*).

1927. Barnard, *l.c.*, p. 896 (*Lirus*).

1937. Norman, Discovery Rep., xvi, pp. 117, 118 (comments on subdivision of genus).

Mr. J. R. Norman recommends the use of this name, which is in conformity with American usage. *Leirus* is admittedly preoccupied; Agassiz' emendation may be valid for the Coleopterous genus, but cannot be valid also for Lowe's genus.

Agassiz gave the etymology of *Leirus* as *λεῖρος* = *subtilis*; but Valenciennes claimed that it was the latinised form of "leiro," the Portuguese name of the fish at Madeira.

Schedophilus ovalis (C. & V.).

Figs. 10, *g*; 13.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., ix, p. 346 (*Centrolophus o.*) and p. 348 (*C. crassus*).

1843/4. Valenciennes, *l.c.*, p. 43 (*Crius bennettii*).

1843/4. *Id.*, *ibid.*, p. 45, pl. 9, fig. 1 (*Crius berthelotii*).

1896. Collett, Res. Sci. Camp. Monaco., x, p. 27 (*L. bennetti*).

1902. Regan, *l.c.*, p. 198 (*Lirus o.*).

1919. Roule, Res. Sci. Camp. Monaco, lii, p. 42 (*Centrolophus crassus*).

1933. Roule and Angel, *ibid.*, lxxxvi, p. 83 (*Centrolophus o.*).

1937. Pellegrin, Bull. Soc. centr. Aqu. Pêche., xliv, pp. 33-36, 2 figs. (bionomics and fishery).

Depth (reckoned as 155 mm.) 3 in total length (to end of middle caudal rays), $2\frac{2}{3}$ to end of lat. line tubules; length of head $4\frac{1}{2}$ and $3\frac{2}{3}$ in the above lengths respectively. Eye slightly less than snout (in true profile), $4\frac{1}{2}$ in length of head, not quite twice in interorbital width (point to point, not around the strongly convex curve), which is $2\frac{2}{3}$ in length of head. Maxilla extending scarcely beyond vertical from anterior margin of eye. Narrowest (posterior) width of pre-orbital $\frac{1}{2}$ eye diameter.

Preopercle denticulate, subopercle less conspicuously so. A single row of setiform teeth in both upper and lower jaws; no teeth on vomer, palatines, or tongue. Gill rakers 6 + 16 on 1st arch, the longest not quite as long as longest filaments, which are about $\frac{1}{2}$ eye. Branchiostegals 7. Pseudobranchiae well developed. An oval patch of upper pharyngeal teeth on 2nd arch; 4th pharyngeals extending into oesophageal sacs.

D viii. 27, arising above upper limit of gill opening; 1st spine short, $\frac{1}{3}$ eye, 2nd close behind 1st, $\frac{1}{2}$ eye, following spines graduated to the rays, 9th about $1\frac{1}{2}$ times the eye, 9th or 10th ray the longest. A iii. (17, middle portion of fin missing). P 22. Ventrals about $\frac{1}{2}$ length of head, folding into a slight groove, innermost ray connected with body by membrane.

Scaling on back beginning only a short distance in front of dorsal fin, 5-6 (not more) predorsal scales. 2-3 rows on lower part of cheek, *i.e.* across middle of preopercle. Opercle and subopercle scaly; rest of head, lower jaw and gular region naked, with numerous pores, the top of the head somewhat spongy.

Lat. line *ca.* 95; about 18 between 1st dorsal spine and origin of lat. line; about 42 around caudal peduncle; base of dorsal and anal, and pectoral for a short distance, scaly.

Oesophageal sacs kidney-shaped, lying athwart the oesophagus (fig. 10, *g*, cross-section). Six large and bulky, digitiform pyloric caeca.

Length 470 mm. to end of middle caudal rays, 430 mm. to end of scaling on caudal; depth of body 150-160 mm. (difficult to measure exactly on account of scaly base of dorsal fin); length of head 110 mm.; snout 25 mm. in true profile (30 mm. if measured from middle point of tip of snout to eye); eye 24 mm.; pectoral 95 mm.

Colour.—Grey with a purplish tinge, probably more silvery when the scales are in position, top of head and all the fins darker; roof of

mouth purplish grey, but tongue and floor of mouth pale; gall-bladder very distinctly green.

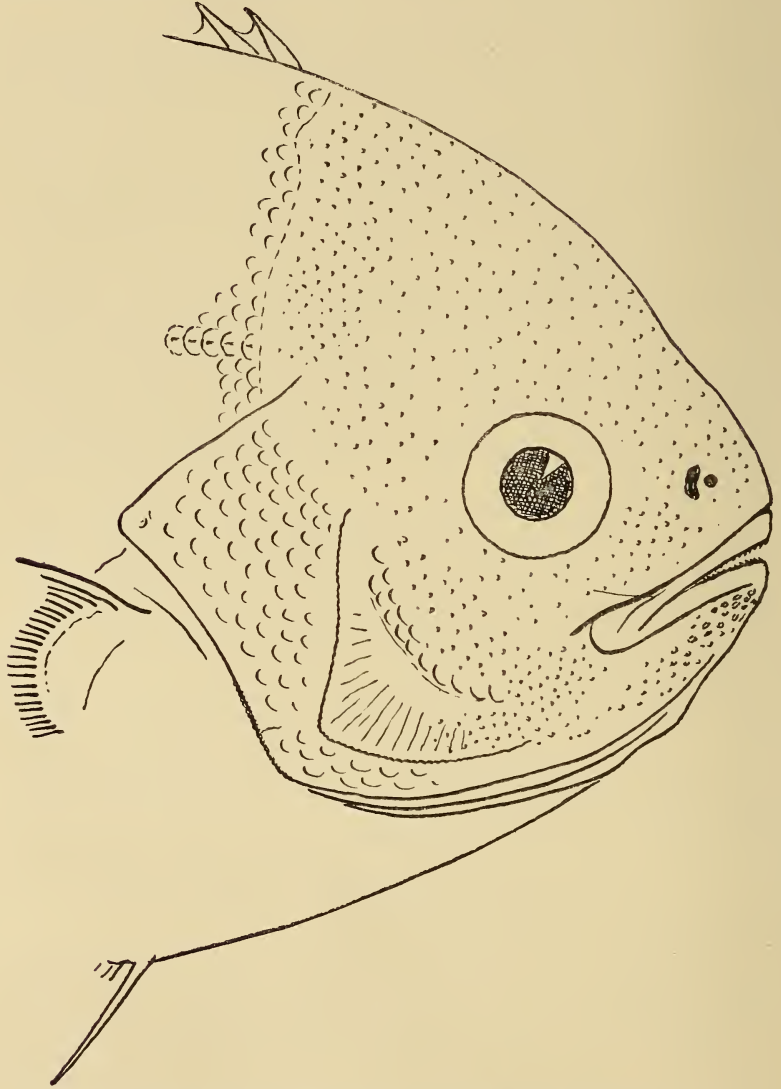


FIG. 13.—*Schedophilus ovalis* (C. and V.). Head to show scaling and pores (diagrammatic, the scales are not numerically correct).

Locality.—Off west coast of Cape Peninsula, approx. 150 fathoms. Capt. Pace, June 1939.

Distribution.—Madeira, Canary Is., Azores, Moroccan coast, Mediterranean.

Remarks.—The specimen is a male. A large hemispherical hole, about $1\frac{1}{2}$ inches across, has been scooped out (? eaten by a Hag-fish) on the lower part of the right-hand side at the middle of the anal fin and injuring also the fin itself; the exposed flesh has been covered over by a layer of thick skin, but no new scales have been developed.

For the purpose of proportional measurements the above lengths have been chosen because I am not certain what actual points Regan in his table of measurements of British Museum specimens (*l.c.*, p. 199) has taken as the junction of the trunk with the "caudal". For the larger specimens he gives the "caudal" as approximately one-fifth of the total length. One-fifth of the total length of the present fish reaches from the end of the middle caudal rays to the narrowest part of the caudal peduncle; but there are many scales, including lat. line tubules behind this point. A more exact measurement is: tip of snout to end of hypural 415 mm., end of hypural to end of middle caudal rays 55 mm.

Gen. PALINURICHTHYS Blkr.

1859. Bleeker, *Acta Soc. Indo-Neerl.*, vi, p. xxii.

1859. Günther, *Cat. Fish. Brit. Mus.*, i, pp. 273, 337 (*Hyperoglyphe*).

1937. Norman, *Discovery Rep.*, xvi, pp. 117, 118.

Palinurichthys (Hyperoglyphe) porosa (Rich.).

Fig. 14.

1845. Richardson, *Voy. "Erebus and Terror"*, Fish, p. 26, pl. 16, figs. 5, 6. (*Diagramma p.*)

1889. Günther, *Challenger Rep.*, xxxi, p. 11, pl. 2, fig. F (*Lirus p.*).

1902. Regan, *Ann. Mag. Nat. Hist.* (7), x, p. 202 (*Lirus p.*).

1929. McCulloch, *Mem. Austr. Mus.*, v, p. 125 (*Hyperoglyphe p.*).

1937. Norman, *l.c.*, p. 118 (*Hyperoglyphe o.*).

Description of two specimens 520 and 530 mm. in length (to end of middle caudal rays); immature, with feebly developed gonads.

Depth not quite 3, head 3 times, in length (excl. caudal fin); thickness at base of pectorals about $\frac{1}{2}$ length of head. Caudal peduncle twice as long as its least depth. Eye $4\frac{3}{4}$ in head, $1\frac{1}{4}$ in snout (slightly less as figured), 2 in interorbital width (over the curve). Snout rounded, lips thin. Mouth slightly oblique, lower jaw pro-

jecting slightly beyond upper (when closed). Maxillary extending to below centre of eye, not concealed under preorbital, with supplementary bone. Edge of preopercle denticulate, edges of opercle and subopercle very finely denticulate where they meet, edge of preorbital

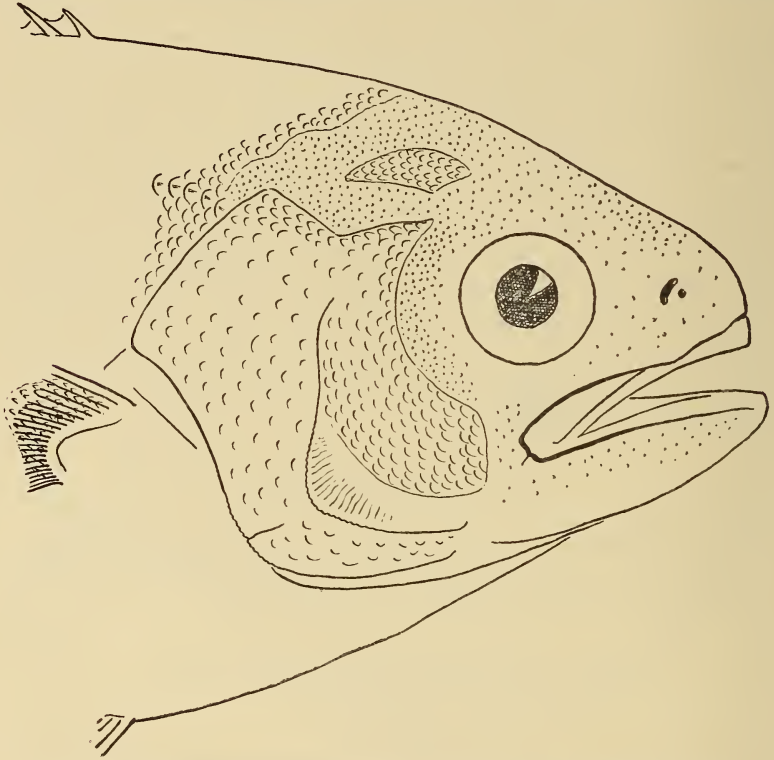


FIG. 14.—*Palinurichthys porosa* (Rich.). Head to show scaling and pores (diagrammatic, the scales are not numerically correct).

smooth. Nostrils about midway between tip of snout and anterior margin of eye.

Teeth in jaws small, numerous, conical, in a single row in each jaw; no teeth on palate or tongue. Upper pharyngeals, none on 1st arch, an elongate patch on 2nd, an oval patch on 3rd arch, 4th projecting into lumen of oesophagus.

Gill-rakers 7 + 16 or 17 on 1st arch; longest rakers about $\frac{1}{2}$ eye diameter, not as long as longest filaments. Pseudobranchiae well developed. Branchiostegals 7. Gill membranes free from isthmus.

Oesophageal sacs feebly developed. Lining of oesophagus plicate.

Pyloric caeca numerous, but impossible to count owing to surrounding fatty tissue.

D viii. i. 19 or 18, 1st spine arising in vertical from axil of pectoral, 4th and 5th spines longest, $\frac{3}{4}$ eye diameter, 6th–8th decreasing, 8th longer than 1st but shorter than 2nd, the spine at beginning of soft dorsal slightly shorter than 4th or 5th spines, not quite $\frac{1}{2}$ length of longest rays which are $\frac{2}{3}$ length of head, rays decreasing to last which is $\frac{3}{4}$ eye diameter.

A iii. 14, 3rd spine subequal to 3rd dorsal spine, longest rays not quite as long as longest dorsal rays. P 21, falcate, $1\frac{4}{5}$ in length of head. V not quite $\frac{1}{2}$ length of head, spine arising in vertical from middle of pectoral base and from 1st dorsal spine, inner ray joined to belly by membrane.

Scales mostly lost, a few remaining beneath pectoral fins, along lat. line, and at bases of dorsal and anal, thin, cycloid. No pores in scale pockets. Head and snout naked, with numerous pores which extend on to preorbital and the postorbital crescent; an isolated patch of scales on the supra-scapular region. Preopercle (except lower corner) scaly, about 9 rows; opercle and subopercle also scaly. Soft dorsal and anal scaly at base, also pectoral for a short distance.

Lateral line becoming straight about opposite beginning of anal or middle of soft dorsal, approx. 72 (but scale pockets difficult to count accurately), 10 to vertical from 1st dorsal spine, 56 to vertical from last dorsal ray; l. tr. approx. 11 between l.l. and 1st dorsal spine, approx. 18 between l.l. and beginning of soft dorsal; approx. 30 around caudal peduncle.

520 and 530 mm. (to end of middle caudal rays), end of hypural to end of middle caudal rays 60 and 65 mm. resp. Purplish-grey, tongue and lining of mouth grey, dorsal fin blackish-grey, anal pectorals and ventrals grey; iris dark, pupil as preserved pale (probably translucent when alive).

Locality.—Stock-fish ground N.W. of Table Bay, approximately 250 fathoms: (larger specimen) Nov. 1941 (Dr. Molteno, Vitamin Oils Ltd.), (smaller specimen) March 1943 (National Trawling and Fishing Co. Ltd.).

Remarks.—Specimens of *porosa* up to 140 mm. in length have been described from the coast of Australia (Richardson) and the Kermadec Islands (Günther). Richardson's type is the largest known specimen, and there is a close agreement between his description and figure and the present specimens. The points of agreement include the relative

lengths of the dorsal spines, and the isolated patch of scales on the supra-scapular region. The anterior rays, however, of the soft dorsal and anal fins, especially of the former, are considerably longer than the hinder rays, whereas in Richardson's specimen there is much less difference in length. The pectoral is distinctly falcate instead of broadly rounded as shown in Richardson's figure. There are 1 or 2 rays less in the dorsal and 1 less in the anal than in the type.

These differences, and the diminution in the denticulation of the edges of the preorbital, opercle and subopercle, may very likely be due to the greater size of the present specimens.

The North Atlantic species *P. perciformis* (Mitchell), according to Regan (*l.c.*, 1902, p. 202), has the dorsal spines behind the 4th sub-equal instead of decreasing in length. I have not seen Morton's description of the Tasmanian *H. johnstonii* (1888, Pap. Proc. Roy. Soc. Tasman. for 1887, pp. xlvii and 77, plate).

For the present, therefore, the Cape specimens are referred to Richardson's species.

FAMILY SCORPAENIDAE.

Scorpaena kowiensis J. L. B. Smith.

1935. Smith, J. L. B., Rec. Albany Mus., iv, p. 224.

Port St. Johns, one specimen, 1944. 112 mm. Well-developed supraorbital tentacles. Four skinny flaps along the lateral line, the last at base of caudal peduncle.

Red-brown, obscurely mottled; dorsal fin dark brown, mottled, with an oblique pale band on soft dorsal from top of 1st ray to base of posterior rays; anal with 3 oblique dark bars, ground colour buff between basal and middle bars, crimson between latter and marginal bar; pectoral with dark spots forming bars; pelvics bright orange-red in axils, rest dull salmon, with a dark bar across middle and another along margin; caudal irregularly barred.

This second specimen with fin formula similar to that of the type, seems to confirm the validity of the species, though the additional differences formerly supposed to distinguish it from *haplodactylus* prove to be fallacious. The type was 59 mm. long, and possibly the supraorbital tentacles and skinny flaps had not been developed, or they had been rubbed off when the specimen was "beach-rolled". The present specimen was also picked up on the beach after a cold snap, but fortunately is in excellent condition.

Gen. SCORPAENODES Blkr.

1857. Bleeker, Nat. Tijdschr. Ned. Ind., xiii, p. 371 (pro *Scorpaenichthys* Blkr. 1856, non Girard 1854).

Resembles *Scorpaenopsis* in the absence of palatine teeth, but has D xiii, and ctenoid scales on the head.

Scorpaenodes guamensis (Q. and G.).

1824. Quoy and Gaimard, Voy. Uranie & Phys. Zool., p. 326 (*Scorpaena g.*).

1878-88. Day, Fish. Ind., p. 150, and Supplem., p. 788 (*Scorpaenopsis g.*).

1885. Ramsay and Ogilby, Proc. Linn. Soc. N.S.W., x, p. 577 (*Sebastes scabra*).

1913. McCulloch, Rec. Austral. Mus., ix, p. 387, pl. 13, fig. 2 (*Sebastopsis scabra*).

1928. Fowler, Fishes of Oceania. Mem. B. P. Bishop Mus., x, p. 289, and p. 290 (*scabra*).

1931. *Id.*, Supplement 1, *Ibid.*, xi, p. 349.

1943. Schultz, Bull. U.S. Nat. Mus., no. 180, pp. 170 (in key), 173.

A specimen, 93 mm. in length, from the neighbourhood of Port St. Johns, agrees closely with Fowler's description of *scabra*, except as regards the suborbital stay which agrees better with Garman's figure (Bull. Mus. Comp. Zool. Harv., xxxix, no. 8, pl. 1, fig. 2) of *erinacea* (= *guamensis fide* Fowler *l.c.*). A smooth keel ends below the anterior third of eye, followed by two keels each ending in a spine, the 1st below middle of posterior third of eye, the 2nd near edge of preopercle which bears a double spine.

D xiii. 10. A iii. 5. 2nd anal spine nearly as long as the depressed anal fin.

McCulloch's figure differs in showing the middle keel (*i.e.* the 1st keel ending in a spine) considerably shorter than the posterior one, whereas in Garman's figure and the present specimen the difference in length is not so great, though the posterior keel is the longest.

S. guamensis is recorded from the Red Sea, Malaya, East Indies, Australia, and Southern Pacific, *scabra* from the last two areas. Though both McCulloch and Fowler maintain the two species, one wonders whether they may not really be conspecific. The present specimen appears to be a male. Possibly the length of the 2nd anal spine is a sexual character. Schultz finds that it is very variable, and is inclined to regard *scabra* as a synonym.

FAMILY MONACANTHIDAE.

1927. Barnard, *l.c.*, p. 949 (*Balistidae*: part).

Gen. STEPHANOLEPIS Gill.

1861. Gill, Proc. Ac. Nat. Sc. Philad., p. 78.

1940. Fraser-Brunner, Ann. Mag. Nat. Hist. (xi), v, 518 (key to species).

Distinguished from *Monacanthus* by the pedunculate dermal scales.

Fraser-Brunner has revised the genus, redefined the true *setifer* of Bennett (a Caribbean species), and resurrected Castelnau's South African species *auratus*.

Key to the South African species.

1. Profile of snout concave. Length of caudal peduncle 3 in length of head. D and A rays 32-33. P. 14 *auratus*.
2. Profile of snout straight. Length of caudal peduncle 4 in head. D and A rays 30-31. P. 13 *rectifrons*.

Stephanolepis auratus (Cast.)

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 77 (*Monacanthus a.*).

1927. Barnard, *l.c.*, p. 955 (*setifer*, non Bennett).

1935. Smith, Rec. Albany Mus., iv, p. 228, pl. 19, fig. B (*setifer*, non Bennett).

1940. Fraser-Brunner, *l.c.*, pp. 522 (in key), 532.

Brownish with indistinct dark or blackish spots, mostly transverse, but some of them usually more or less confluent to form a longitudinal stripe on hinder part of body and caudal peduncle; caudal fin obscurely barred. Castelnau's 60 mm. specimen was golden brown, soft dorsal and anal fins yellow. Length of largest specimen in South African Museum 170 mm.

Localities.—Knysna to Zululand.

Stephanolepis rectifrons F-B.

1940. Fraser-Brunner, *l.c.*, pp. 522 (in key), 531, fig. 6.

Dark brown with more or less distinct black blotches tending to form transverse bands; caudal fin with 2 dark bars. 125 mm.

Localities.—Delagoa Bay and Zanzibar.

FAMILY OSTRACIONTIDAE.

1935. Fraser-Brunner, Ann. Mag. Nat. Hist. (x), xvi, p. 313 (synopsis of genera).

1940. *Id.*, *ibid.* (xi.), vi, p. 390 (sexual dimorphism).

Ostracion lentiginosus Bl. Schn.

1851. Bleeker, Verh. Bat. Gen., xxiv, p. 32, pl. 6, fig. 13 (*sebae* = ♂).

1865. *Id.*, Atlas Ichthyol., v, p. 41, pl. 204, fig. 1 (*sebae*).

1927. Barnard, *l.c.*, p. 962 (*punctatus*).

1934. Fowler, Proc. Ac. Nat. Sc. Philad., lxxxvi, p. 510.

1940. Fraser-Brunner, *l.c.*, p. 391.

Two specimens have been washed up on the beach at Strandfontein, in False Bay (Cape) (Jan. and March 1938).

One, 28 mm. in length (incl. caudal), agrees with the Natal specimen described in 1927. The smaller one, 10 mm. in length (incl. caudal), has the ventro-lateral keel more pronounced, and a low blunt ridge (or longitudinally compressed tubercle) immediately in front of the dorsal fin, but not extending forwards beyond the vertical from base of pectoral fin. The hinder part of the carapace is therefore 5-angled. No indication of any spines.

FAMILY MOLIDAE.

Mola mola and *lanceolata*.

1861. Castelnau, Mem. Poiss. l'Afr. Austr., p. 75 (*Pedalion*, *Aledon*, *capensis*).

1935. Barnard, Ann. S. Afr. Mus., xxx, p. 653, figs. 5-7.

1937. Gudger, Proc. Zool. Soc. Lond., cvii, A, p. 353, figs. 1-24 and pls. 1-5 (natural history and distribution of *lanceolata*) (references).

In the list of records (1927) I omitted Castelnau's record of *mola*; and in the files of the South African Museum I have found two other records both presumably referring to *mola*.

(*mola*) 5th November 1856. Castelnau. Length 1000 mm.

Height 600 mm.

(? *mola*) April 1878.

(? *mola*) 21st December 1881.

} reported to S. Afr. Mus.

Since 1934 the following are the records of these two Ocean Sunfishes from the neighbourhood of Table Bay, which have been reported to the South African Museum:—

(*mola*) June 1935. 36 inches in length.

(*mola*) July 1935. $17\frac{1}{2}$ inches in length (cast of this in S. Afr. Mus.).

(*mola*) 1st October 1935. 24 inches in length.

(*mola*) 18th November 1935.

(*mola*) 11th January 1936.

(*mola*) 25th January 1938.

(*mola*) 20th March 1938.

(*mola*) 10th October 1939.

(*mola*) 2nd October 1940.

(*lanceolata*) 15th January 1942.

Amongst some papers of the late Dr. J. D. F. Gilchrist, I have found photographs of two specimens which seem worth figuring here.

The small specimen (Plate XII), Table Bay, 1900, was approximately 23–24 inches in length, judging by the size of a man's head alongside the fish in the original photograph. The profile of the tail has a perfectly even curve. The $17\frac{1}{2}$ in. and 24 in. specimens recorded above were of the same shape.

The large specimen (Plate XIII), Kalk Bay (False Bay), 1901, was approximately 6 feet in length, judging by the man alongside in the original photograph. Both dorsal and anal fins and the lower part of the caudal fin appear to have suffered injury while the fish was alive. The frontal view shows unusually heavy supra-orbital ridges.

Mola alexandrini (Ranz.).

1839. Ranzani, Nov. Comm. Ac. Sci. Inst. Bonon., iii.

1935. Barnard, *l.c.*, p. 655, fig. 5, *a*, *b*, and p. 658 (*mola*).

In 1935 I recorded a remarkable Sun-fish stranded in 1934 at Kommetje (west coast of Cape Peninsula), which I regarded as a freak specimen of *mola*. This opinion I am now inclined to revise in view of a very similar specimen which was caught near the shore at Sea Point (Cape Town) in January 1942.

Its length was 5 ft. 10 in. In side view the shape was similar to that of the Kommetje specimen (*l.c.*, fig. 5, *a*), but not quite so prominently protuberant on the throat; and the profile of the dorsal ridge began farther forward, above or slightly in advance of the vertical from the eye. In fact, if one assumes a certain crudity in Ranzani's drawing, the present specimen is intermediate between his and my figures.

The coloration of both the Kommetje and Sea Point specimens

was considerably paler than is usually the case in typical *mola*. The upper part of the back, and the dorsal and anal fins, are blackish, but the dark colour shades off, in an irregular and blotchy pattern, into grey on the flanks behind the pectoral fin, and the lower parts are more or less silvery.

Both the Kommetje and Sea Point specimens appeared to be males; at least they were not definitely females. The former specimen was somewhat decomposed when I examined it, and the latter had the abdominal cavity cut open by curious sightseers and the organs were partially dried in consequence.

I am indebted to Mr. J. R. Norman for the tracing of Ranzani's figure; I do not know what description Ranzani gave. But the presence at the Cape of two examples of such extraordinary shape certainly seems to warrant the use of a distinctive specific name, and Ranzani's name seems suitable.*

HYPEROSTOSIS.

Figs. 15, 16.

Swelling and thickening of the supraoccipital bone is well-known in a number of fishes: *Platax*, *Sparidae*, *Sciaenidae*, etc. (Köstler, Zeitschr. wiss. Zool., xxxvii, p. 429, 1882; Pellegrin, Mem. Soc. zool. France, xvi, 1903, p. 118, 1904). Ebina (J. Imp. Fish. Inst. Tokyo, xxxi, p. 69, 1936) has given photographs of the enlarged supraoccipital bone in the ♂ and ♀ of *Evynnis cardinalis*, showing that the bone tends to become thicker and more elevated in the former.

A figure is given here (fig. 15, *a*) of the supraoccipital of a Red Stumpnose, *Chrysoblephus gibbiceps*, from a skeleton, sex unknown, in the South African Museum.

In the course of mounting for exhibition a large specimen of *Caranx equula* (total length 580 mm., sex not determinable), Mr. Drury, the Museum taxidermist, discovered a relatively enormous bony mass on the top of the skull. This proved to be the enlarged supraoccipital (fig. 16, *c*, *d*). Two other specimens were then examined. One 285 mm. in length (sex not determinable), showed an early stage of hyperostosis (fig. 16, *b*). The other, 185 mm. in length, showed no sign of hyperostosis, the supraoccipital forming a thin vertical keel (fig. 16, *a*).

At the same time Mr. Drury found the two suprascapulars. These also are subject to hyperostosis. In the smallest specimen, with the

* See note p. 406.

thin keel-like supraoccipital, they are elongate-oval in shape and quite thin (dorso-ventrally) (fig. 16, *a*). In the 285 mm. specimen they are subcylindrical, with a groove and a curved ridge on the

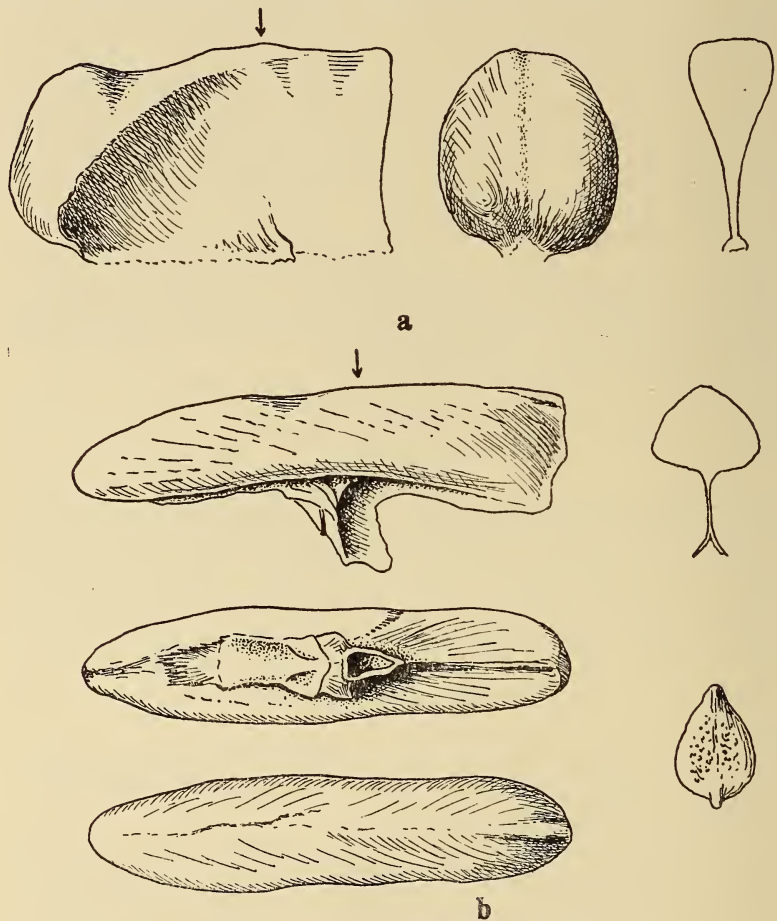


FIG. 15.—Hyperostosis of supra-occipital bone. *a*, *Chrysolephus gibbiceps*, lateral and frontal views, and section at arrow; length 70 mm., height at arrow 37 mm. *b*, lateral, ventral, dorsal, and posterior views, and section at arrow, of a supra-occipital bone from Strandlooper kitchen-midden deposits at Hermanus, Cape Province; length 90 mm.

external surface (fig. 16, *b*). In the largest specimen they are very massive; the ridge has been obliterated by the excessive growth of bone, and only a faint trace of the groove remains (fig. 16, *e, f*).

The real reason, however, for introducing this subject of hyperostosis



Xenolepidichthys americanus N. and F.

